Exhibit 1

IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
TYLER DIVISION

CELLULAR COMMUNICATIONS EQUIPMENT LLC,	§	
	§	
Plaintiff,	§	
	§	**Civil Action No. 6:13-cv-507-LED**
v.	§	
	§	**(Lead Case for Consolidation)**
HTC CORPORATION, et al.,	§	
	§	
Defendants.	§	

DECLARATION OF DR. ROBERT AKL

I, Robert Akl, D.Sc., hereby declare as follows:

1. My name is Robert Akl. I am at least eighteen years of age. I reside in Denton County in the State of Texas. I have personal knowledge of and am competent to testify as to the facts and opinions herein.

2. I have been asked by Defendants to provide my expert opinions relating to certain terms and phrases of Claim 11 of U.S. Patent No. 6,819,923 ("the '9923 Patent"); Claim 11 of U.S. Patent No. 6,810,019 ("the '019 Patent"); Claims 1, 9, and 18 of U.S. Patent No. 7,941,174 ("the '174 Patent"); and Claims 1, 12, and 24 of U.S. Patent No. 8,055,820 ("the '820 Patent").

3. I have been informed that Cellular Communications Equipment, LLC ("CCE") is currently asserting the '9923 Patent, the '019 Patent, the '174 Patent, and the '820 Patent against multiple defendants in litigation pending in a United States District Court.

4. I currently hold the opinions set forth in this declaration.

5. In summary, it is my opinion that the following claim terms and phrases, read in light of the specification and the prosecution history of the respective patent, fail to inform, with reasonable certainty, those skilled in the art about the scope of the claim in which the terms or phrases appear:

a. "the processing means are also arranged to set for the measurement pattern definition a delay according to the measurement pattern definitions" ('019 Patent, Claim 11);

b. "processing means for arranging gaps in a time-slot frame according to the measurement pattern definitions" ('019 Patent, Claim 11);

c. "determining a transmit power difference which is to be maintained by the subscriber station between on one hand a total maximum transmit power of

the subscriber station for the codes and on another hand a total transmit power of the subscriber station for the codes at a start of a message transmission using a first one of the codes" ('174 Patent, Claim 1);

d. "maintaining a previously determined transmit power difference by the subscriber station between on one hand a total maximum transmit power of the subscriber station for the codes and on another hand a total transmit power of the subscriber station for the codes at a start of a message transmission using a first one of the codes" ('174 Patent, Claim 9);

e. "determine a transmit power difference which is to be maintained by the subscriber station between on one hand a total maximum transmit power of the subscriber station for the codes and on another hand a total transmit power of the subscriber station for the codes at a start of a message transmission using a first one of the codes" ('174 Patent, Claim 18);

f. "wherein the designating designates the long buffer status reporting format when there is sufficient uplink bandwidth to communicate using the long buffer status reporting format" ('820 Patent, Claims 1 and 24);

g. "wherein the designating unit is configured to designate the long buffer status reporting format when there is sufficient uplink bandwidth to communicate using the long buffer status reporting format" ('820 Patent, Claim 12);

h. "designating unit" ('820 Patent, Claim 12);

i. "means for associating a specific value of said set of specific parameter values indicated by one of said index with the corresponding second parameter of a neighbor cell" ('9923 Patent, Claim 11); and

j. "means for receiving a neighbor cell information message" ('9923 Patent, Claim 11).

6. My detailed opinions are set forth below.

I. Qualifications

7. I have summarized in this section my educational background, work experience, and other relevant qualifications. A true and accurate copy of my curriculum vitae is attached as Attachment A.

8. I earned my Bachelor of Science degrees in Electrical Engineering and Computer Science *summa cum laude* with a ranking of first in my undergraduate class from Washington University in Saint Louis in 1994. In 1996 I earned my Master of Science degree in Electrical Engineering from Washington University in Saint Louis. I earned my Doctorate of Science in Electrical Engineering from Washington University in Saint Louis in 2000, with my dissertation on "Cell Design to Maximize Capacity in Cellular Code Division Multiple Access (CDMA) Networks."

9. After obtaining my Doctorate of Science degree, I worked as a Senior Systems Engineer at Comspace Corporation from October of 2000 to December of 2001. In this position, I designed, and developed advanced data coding and modulation systems for improving the reliability and increasing the available data rates for cellular communications.

10. In January of 2002, I joined the faculty of the University of New Orleans in Louisiana as an Assistant Professor in the Department of Electrical Engineering. While in this position, I designed and taught two new courses called "Computer Systems Design I and II." I also

developed a Computer Engineering Curriculum with strong hardware-design emphasis, formed a wireless research group, and advised graduate and undergraduate students.

11. In September of 2002, I received an appointment as an Assistant Professor in the Department of Computer Science and Engineering at the University of North Texas, in Denton, Texas. In May of 2008, I became a tenured Associate Professor in the Department of Computer Science and Engineering. As a faculty member, I have taught courses and directed research in wireless communications, including 2G, 3G, 4G, CDMA/WCDMA, GSM, UMTS, LTE, wireless sensors, VoIP, multi-cell network optimization, call admission control, channel coding, ad-hoc networks, and computer architecture.

12. I have authored and co-authored approximately 65 journal publications, conference proceedings, technical articles and papers, book chapters, and technical presentations, in a broad array of communications-related technology, including networking and wireless communications. I have also developed and taught over 70 courses related to communications and computer system design, including a number of courses on wireless communications, communications systems, computer systems design, and computer architecture. These courses have included introductory courses on communication systems and sensor networks, as well as more advanced courses on wireless communications. A complete list of my publications and the courses I have developed and/or taught is also contained in my curriculum vitae.

13. In forming the opinions set forth in this declaration, I have reviewed the ’019 Patent, the ’174 Patent, the ’820 Patent, and the ’9923 Patent in their entirety, along with their prosecution histories. Additionally, I have considered my own experience and expertise regarding the knowledge of persons of ordinary skill in the relevant art in the timeframe of the claimed priority date and thereafter for each of those patents.

II. Legal Standards

14. I am not an attorney. However, the laws of claim construction and indefiniteness have been explained to me, and my understanding is as follows.

15. I understand that the claims of a patent are presumed to be valid, and that invalidity of a claim must be proven by clear and convincing evidence.

A. Claim Construction

16. I understand that the claims of a patent define the limits of the patentees' exclusive rights. In order to determine the scope of the claimed invention, courts typically construe (or define) claim terms, the meaning of which the parties dispute. I understand that claim terms should generally be given their ordinary and customary meaning as understood by one of ordinary skill in the art at the time of the invention and after reading the patent and its prosecution history.

17. Claims must be construed, however, in light of and consistent with the patent's intrinsic evidence. Intrinsic evidence includes the claims themselves, the written disclosure in the specification, and the patent's prosecution history, including the prior art that was considered by the United States Patent and Trademark Office ("PTO").

18. The language of the claims helps guide the construction of claim terms. The context in which a term is used in the claims can be highly instructive.

19. The specification of the patent is the best guide to the meaning of a disputed claim term. Embodiments disclosed in the specification help teach and enable those of skill in the art to make and use the invention, and are helpful to understanding the meaning of claim terms. Nevertheless, limitations should not be imported from the specification into the claims.

20. In the specification, a patentee may also define his own terms, give a claim term a different meaning than it would otherwise possess, or disclaim or disavow claim scope. A claim term is generally presumed to possess its ordinary meaning. This presumption, however, does not

arise when the patentee acts as his own lexicographer by explicitly defining or re-defining a claim term. This presumption can also be overcome by statements, in the specification or prosecution history of the patent, of clear disclaimer or disavowal of a particular claim scope.

21. I understand that the specification may also resolve any ambiguity where the ordinary and customary meaning of a claim term lacks sufficient clarity to permit the scope of the claim to be ascertained from the claim words alone.

22. I understand that the prosecution history is another important source of evidence in the claim construction analysis. The prosecution history is the record of the proceedings before the PTO, including communications between the patentee and the PTO regarding the patent application. The prosecution history can inform the meaning of the claim language by demonstrating how the patentee and the PTO understood the invention and whether the patentee limited the invention in the course of prosecution, making the claim scope narrower than it would otherwise be. I understand that a patentee may also define a term during the prosecution of the patent. The patentee is precluded from recapturing through claim construction specific meanings or claim scope clearly and unambiguously disclaimed or disavowed during prosecution.

23. I understand that extrinsic evidence may also be considered when construing claims. Extrinsic evidence is any evidence that is extrinsic to the patent itself and its prosecution history. Examples of extrinsic evidence are technical dictionaries, treatises, and expert testimony. I understand that extrinsic evidence is less significant than the intrinsic record in determining the meaning of claim language.

B. Means-plus-function terms

24. I understand that some claim terms can be written in a means-plus-function form. Construing means-plus-function claim terms involves two steps. First, the particular claimed function must be identified. Second, the corresponding structure disclosed in the specification as

performing that function must be identified. I understand that in order for a structure to qualify as the corresponding structure, the structure disclosed in the specification must be clearly linked to and capable of performing the function claimed by the means-plus-function limitation. I understand that in order to meet the definiteness requirement of 35 U.S.C. § 112, the specification must include a disclosure sufficient for one skilled in the art to understand what structure disclosed in the specification performs the recited function.

25. I understand that, generally, for claims directed towards computer-implemented inventions, the structure disclosed in the specification must be more than a general purpose computer or microprocessor. This is because general purpose computers can be programmed to perform different tasks in different ways and such a disclosure would effectively provide no limit on the scope of the claims. Thus, the corresponding structure for a computer-implemented function is not a computer, but is a specific algorithm that allows a general-purpose computer or microprocessor to perform the claimed function. An "algorithm" is a fixed step-by-step procedure for accomplishing a given result. A patentee may express the procedural algorithm in any understandable terms including as a mathematical formula, prose, or a flow chart. A patentee is not required to produce a listing of source code or a highly detailed description of the algorithm to be used to achieve the claimed function in order to satisfy 35 U.S.C. § 112, ¶ 6.[1] The patentee is required, however, to at least disclose the algorithm that transforms the general purpose microprocessor to a special purpose computer which is programmed to perform the algorithm. I am informed that a patent claim is invalid as being indefinite if the specification fails to disclose in

[1] I understand that pursuant to a recent amendment, means-plus-function limitations are now governed by section 112(f) rather than section 112, paragraph 6, though the substantive requirements of that paragraph have not changed. I understand that the amended statute applies only to patents and applications filed on or after September 16, 2012. As the patents addressed in this declaration were each filed prior to September 16, 2012, I will refer to the pre-amendment paragraph numbers.

sufficient detail an algorithm for programming the computer or microprocessor. I understand that the disclosure of various parameters that may be applied or used by an algorithm does not satisfy the requirement to disclose the specific algorithm specifying how to carry out the claimed function. There is one limited exception to this general rule—a patent can meet the requirements of Section 112, ¶ 6 by reciting only a general-purpose computer or microprocessor (with no corresponding algorithm) if the claimed function can be achieved without any special programming.

26. It is my further understanding that although a claim element that does not contain the term "means" is presumptively not subject to 35 U.S.C. § 112, ¶ 6, this presumption can be rebutted by showing that the claim element recites a function without reciting sufficient structure for performing that function. It is my further understanding that certain terms have been explicitly recognized as "nonce" words or verbal constructs that are not recognized as the name of structure and are simply a substitute for the term "means for." While claim language, including adjectival qualifiers, that further defines a generic term can sometimes add sufficient structure to avoid 35 U.S.C. § 112, ¶ 6, not just any adjectival qualification or functional language will suffice. The proper inquiry is whether the claim limitation itself, when read in light of the specification, connotes to a person of ordinarily skill in the art definite structure for performing the identified functions.

C. Correction of Patent Claims

27. I understand that a court may correct an error in the patent if a person of ordinary skill in the art reading the patent would understand that there is a clear error on the face of a patent. I further understand that if such an error exists, it may be corrected only if (1) the correction is not subject to reasonable debate based on consideration of the claim language and the specification and (2) the prosecution history does not suggest a different interpretation of the claims.

D. Indefiniteness

28. I understand that a claim limitation is indefinite if the claim, when read in light of the specification and the prosecution history, fails to inform with reasonable certainty persons of ordinary skill in the art about the scope of the invention.

III. Materials Reviewed

29. All documents, tangible things, reports, models, data compilations, and references cited in this expert declaration, and the exhibits attached hereto, have been provided to, reviewed by, or prepared by or for me in the preparation of this expert declaration. In addition, the following items have also been provided to, reviewed by, or prepared by or for me in the preparation of this expert declaration:

- Plaintiff's Claim Construction Brief, Ex. A (Oct. 30, 2014) [Dkt. No. 277].
- U.S. Patent No. 6,819,923
- U.S. Patent No. 6,810,019
- U.S. Patent No. 7,941,174
- U.S. Patent No. 8,055,820
- U.S. Patent Application 09/782,360 (filed Feb. 13, 2001) (CCE000001 – CCE000144)
- U.S. Patent Application 11/667,595 (filed Dec. 22, 2008) (CCE001023 – CCE001233)
- U.S. Patent Application 09/831,689 (filed June 12, 2001) (CCE000361 – CCE000568)
- U.S. Patent Application 12/289,825 (filed Nov. 5, 2008) (CCE001234 – CCE001462)
- Plaintiffs' Disclosures Pursuant to P.R. 4-2
- Defendants' Joint Preliminary Proposed Claim Constructions and Extrinsic Evidence Pursuant to Patent Rule 4-2

- Corrected Joint Claim Construction and Pre-Hearing Statement and accompanying exhibits (Sept. 12, 2014) [Dkt. No. 248]
- Dictionary definitions for "receiver" [CCE002445–2456]
- U.S. Patent No. 6,434,389
- U.S. Patent No. 6,185,422
- U.S. Patent No. 6,219,550
- U.S. Patent No. 6,445,924
- U.S. Patent No. 6,522,670
- U.S. Patent No. 6,134,438
- U.S. Patent No. 6,240,292
- U.S. Patent No. 6,473,614
- U.S. Patent No. 6,038,450
- U.S. Patent No. 6,112,089
- U.S. Patent No. 6,640,102
- U.S. Patent No. 6,505,058
- U.S. Patent No. 6,212,384
- U.S. Patent No. 6,178,164
- U.S. Patent No. 6,192,244
- U.S. Patent No. 6,201,966
- U.S. Patent No. 6,151,502
- U.S. Patent No. 6,188,911
- U.S. Patent No. 7,769,926
- U.S. Patent No. 6,694,135
- U.S. Patent No. 5,883,899
- U.S. Patent No. 5,995,836

- U.S. Patent No. 5,991,626
- U.S. Patent No. 5,982,758
- U.S. Patent No. 5,953,320
- U.S. Patent No. 5,930,721
- U.S. Patent No. 5,913,168
- U.S. Patent No. 5,903,840
- U.S. Patent No. 5,854,981
- U.S. Patent No. 5,850,605
- U.S. Patent No. 5,848,063
- U.S. Patent No. 5,794,157
- U.S. Patent No. 5,774,809
- U.S. Patent No. 5,724,665
- U.S. Patent No. 5,640,677
- U.S. Patent No. 5,499,387
- U.S. Patent No. 5,267,261
- U.S. Patent No. 4,850,033
- U.S. Patent No. 6,865,393
- U.S. Patent No. 6,330,232
- U.S. Patent No. 6,266,321
- U.S. Patent Application Publication No. 2002/0049060
- U.S. Patent Application Publication No. 2002/0004406
- U.S. Patent Application Publication No. 2001/0053695
- U.S. Patent Application Publication No. 2009/0080380
- U.S. Patent Application Publication No. 2006/0146833

- U.S. Patent Application Publication No. 2004/0116110
- U.S. Patent Application Publication No. 2003/0207696
- U.S. Patent Application Publication No. 2003/0193969
- U.S. Patent Application Publication No. 2003/0108027
- U.S. Patent Application Publication No. 2003/0103473
- U.S. Patent Application Publication No. 2003/0026235
- U.S. Patent Application Publication No. 2002/0006119
- U.S. Patent Application Publication No. 2001/0008521
- U.S. Patent Application Publication No. 2008/0159184
- U.S. Patent Application Publication No. 2005/0281219
- U.S. Patent Application Publication No. 2004/0066795
- U.S. Patent Application Publication No. 2002/0012332
- UK Patent Application GB 2 335 831 A
- International Patent Application No. WO 99/62278 A1
- International Patent Application No. WO 99/17571 A1
- International Patent Application No. WO 99/13666 A1
- International Patent Application No. WO 99/01005 A1
- International Patent Application No. WO 98/31154 A2
- International Patent Application No. WO 98/53621 A1
- International Patent Application No. WO 2007/100547 A2
- International Patent Application No. WO 2007/147431 A1
- International Patent Application No. WO 03/001681 A2
- European Patent Application No. EP 1 545 040 A1
- European Patent Application No. EP 1 154 667 A2

- European Patent Application No. EP 1 564 905 A2
- European Patent Application No. EP 1 365 520 B1
- European Patent Application No. EP 1 229 755 A2
- European Patent Application No. EP 1 599 063 A1
- European Patent Application No. EP 1 020 999 A1
- European Patent Application No. EP 0 895 435 A1
- European Patent Application No. EP 0 886 453 A2
- German Patent No. DE 198 23 504 A 1
- English Abstract JP2004320164 (A)
- Patent Abstract of Japan No. 11074834
- Patent Abstract of Japan No. 2002118515
- R2-073909 – Nokia Corp., *Scheduling information for E-UTRAN uplink*
- Tdoc R2-074265 – Samsung, *Buffer Status Reporting*
- 3G TR 25.922 v3.0.0 (1999-12) Technical Report – 3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Radio Resource Management Strategies (3G TR 25.922 version 3.0.0)

IV. Asserted Patents

A. The ’019 Patent

1. Summary/Background

30. The ’019 Patent relates to a mobile telephone system that defines measurement gaps for a mobile station (*i.e.*, a mobile device). According to the ’019 Patent, the alleged invention can be used to provide access to a UMTS terrestrial radio access network (“UTRAN”) using a code division multiple access (“CDMA”) system such as “wide code division multiple access” (“WCDMA”). ’019 Patent, Cols. 1:7–10, 4:4–9.

31. While a particular mobile device is located within a cell, the mobile device communicates with that cell's servicing base station. The mobile device receives information from the servicing base station over a downlink channel and transmits information to the base station via an uplink channel. '019 Patent, Col. 1:26–29. All of the mobile devices within a cell communicate with the servicing base station using the same frequency. '019 Patent, Col. 1:17–22. In a WCDMA system, a mobile device can be connected to multiple cells—*e.g.*, receive downlink transmissions from multiple base stations—simultaneously. This is referred to as a "soft handover." '019 Patent, Col. 1:30–34. In order to control the handover, the mobile device must perform several measurements to determine whether to switch to a different base station. '019 Patent, Col. 1:34–39.

32. A mobile device transmits blocks of information to the base station in fixed time periods or frames. '019 Patent, Fig. 2, Col. 5:7–17. In normal transmission mode (as opposed to the compressed mode discussed below) the block of information transmitted in a given frame is spread over the entire frame in order to maintain a constant power level throughout the entire frame. '019 Patent, Cols. 2:9–13, 5:7–17.

33. The mobile device needs an idle period within the frame in which it is not transmitting and/or receiving information to perform necessary measurements, such as measuring the quality of signals received from the neighboring cells' base stations. '019 Patent, Col. 1:50–55. To perform the measurements, the mobile device operates in compressed mode, in which it transmits information to the base station in a shorter time period, thus leaving sufficient time in a particular frame to perform the measurements. '019 Patent, Col. 1:58–67. To maintain signal quality while transmitting over a more compressed period, the mobile device must increase its transmission power. '019 Patent, Col. 1:58–67. After this compressed mode transmission, there is

an idle interval within the frame in which no data is transmitted from the mobile device to the base station. '019 Patent, Col. 1:60–65. The mobile device performs its required measurements during this idle interval in the frame. '019 Patent, Col. 1:60–65.

34. The network periodically directs the mobile device to transmit in compressed mode. '019 Patent, Col. 6:20–23, Figs. 4a, 4b. It does this by allocating idle periods to the connected mobile devices. '019 Patent, Col. 6:20–23, Figs. 4a, 4b. The network informs the mobile device about the timing of the compressed mode transmission by defining and transmitting a measurement pattern definition to the mobile device which provides the locations of gaps in a time-slot frame during which the mobile device can measure the signals from other cells. '019 Patent, Col. 6:20–23, Figs. 4a, 4b.

35. According to the '019 Patent, prior art CDMA systems did not define where in a particular frame compressed mode is used, *i.e.*, where in a frame a gap is generated for measuring parameters. '019 Patent, Col. 2:23–26. Thus, a problem could arise if the gaps in a frame randomly fall in substantially the same place for multiple mobile devices. '019 Patent, Col. 2:26–32. If this happens, multiple mobile devices may simultaneously transmit in compressed mode, *i.e.*, at higher signal strength, resulting in increased interference. '019 Patent, Col. 2:26–32.

36. The alleged invention aims to solve this purported problem by "defining different delays for the measurement patterns of said terminals [mobile devices] so that the gaps of different terminals are substantially at different locations in the time-slot frame," or gaps of different terminals are in different frames. '019 Patent, Col. 10:29–32, Fig. 5.

37. The '019 Patent purports to disclose a terminal (*i.e.*, a mobile device) comprising a receiver for receiving measurement pattern definitions defined by a network and a processing

means for arranging gaps and setting delays in accordance with the measurement pattern definition. '019 Patent, Col. 2:66–3:7.

2. Person of Ordinary Skill in the Art for the '019 Patent

38. I understand that the '019 Patent was filed on February 13, 2001. The '019 Patent also claims priority to the filing date of a Finnish application filed on February 18, 2000. For the purpose of this declaration, I was asked to assume the date of the invention for the '019 Patent was the date of the filing of the Finnish application, February 18, 2000.

39. In determining the characteristics of a hypothetical person of ordinary skill in the art of the '019 Patent as of February 18, 2000, I have considered several things, including that system designers must have a firm knowledge of computer, wireless, and network technologies, yet also understand evolving technology for mobile devices, preferably mobile telephones, to apply the computer, wireless, and network technologies to such systems. I also considered the educational background and experience of those actively working in the field. Finally, I mentally placed myself back in 2000 and considered the engineers that I taught and worked with in the field of this patent.

40. My conclusion is that a person of ordinary skill in the art would have earned a B.S. in computer science, electrical engineering, or a related discipline, plus around two years of experience analyzing, designing, and/or implementing wireless systems, software for mobile computers, and telephony software.

3. Opinion

a) "the processing means are also arranged to set for the measurement pattern definition a delay according to the measurement pattern definitions" (Claim 11)

41. I understand that the phrase "the processing means are also arranged to set for the measurement pattern definition a delay according to the measurement pattern definitions" is a means-plus-function element to be construed in accordance with 35 U.S.C. § 112, ¶ 6.

42. I understand that Defendants have identified the claimed function of this means-plus-function element as "set[ting] for the measurement pattern definition a delay according to the measurement pattern definitions." I understand that CCE has identified the claimed function as "to set for the measurement pattern a delay according to the measurement pattern definition."

43. In my opinion, the structure corresponding to the function "set[ting] for the measurement pattern definition a delay according to the measurement pattern definitions" is the "processing means **630**" described in the specification.

44. Column 10:34–41 describes the claimed invention, and identifies a "processing means **630**" as an essential component, but does not describe an algorithm implemented by the processor. Element 630 of Figure 6 is depicted as a block labeled "CNTL." '019 Patent, Fig. 6. Element 630 is described elsewhere only by reference to its function:

> In block 630, a quality value of the received signal is measured, such as that of the inter-frequency measurement during gaps in compressed mode. The reception level, bit error ratio, SINR ratio (signal/interference+noise ratio), SIR ratio (signal/interference ratio), C/I ratio (carrier/interference ratio) or any other known way of measuring the channel quality).

'019 Patent, Col. 10:1–7.

45. Column 10:42–54 provides that the claimed invention is to be implemented by software in combination with a general purpose microprocessor, or by unspecified hardware. It

states that the "necessary parameters can advantageously be defined on the basis of an algorithm or lookup table." '019 Patent, Col. 10:51–53.

46. It is my opinion that a person of ordinary skill in the art would understand that a general purpose microprocessor would need to be programmed to perform a *specific* algorithm in order to perform the function "set[ting] for the measurement pattern definition a delay according to the measurement pattern definitions." The '019 Patent does not disclose such an algorithm. Thus, Claim 11 is invalid as indefinite.

47. I understand that CCE alleges that the claimed structure for this means-plus-function element is "a processor, controller, or application specific integrated circuit (10:34–52; Fig. 6) configured to apply a connection frame number (CFN) and transmission gap starting slot number (TGSN) parameter combination specific to the terminal," and cites as support the following portions of the '019 Patent: Abstract, Figures 3–6, 2:42–3:33, 5:46–6:19, 7:4–9:5, 10:14–53, and the 6/29/04 Notice of Allowance at 2. Corrected Joint Claim Construction and Pre-Hearing Statement, Ex. A at 2 (Sept. 12, 2014) [Dkt. No. 248]. The portions of the specification and prosecution history cited by CCE do not disclose an algorithm, or any portion of one, that would be required to carry out the function of "set[ting] for the measurement pattern definition a delay according to the measurement pattern definitions."

48. The Abstract describes a method for defining measurements gaps in a wireless telecommunications system. The Abstract also recites that "various delays are defined for the measurements patterns of the terminals so that gaps of different terminals are in substantially different locations in the time-slot frame." The Abstract, however, does not disclose an algorithm, or any portion of one, that would be required for the mobile device to carry out the claimed

function of "set[ting] for the measurement pattern definition a delay according to the measurement pattern definitions."

49. Figure 3 is a graphical depiction of gaps that were already arranged according to a measurement pattern definition, which is transmitted from the base station to the mobile device. Figures 4a and 4b disclose prior art "compressed mode measurement parameters"—selection and re-selection mode measurement patterns, respectively, which are transmitted from the base station to the mobile device. Figure 5 depicts "by way of example the defining of measurement parameters for four mobile stations both according to prior art . . . and according to the invention . . . ." '019 Patent, Col. 7:31–35. These figures depict measurement pattern definitions (or parameters thereof) which are transmitted by the base station to the mobile device. They do not disclose an algorithm, or any portion of one, that would be required for the mobile device to carry out the claimed function of "set[ting] for the measurement pattern definition a delay according to the measurement pattern definitions," which is necessarily performed after the transmission of the measurement pattern definitions to the mobile device.

50. Figure 6 is a high-level depiction of the radio system, and "describes the parts essential for the invention in a radio network subsystem RNS and user equipment UE." '019 Patent, Col. 9:6–7. The "processing means **630**" is shown in this figure as a block labeled "CNTL," with no explanation of the algorithm implemented by the processing means. This figure does not disclose an algorithm, or any portion of one, that would be required for the mobile device to carry out the claimed function of "set[ting] for the measurement pattern definition a delay according to the measurement pattern definitions."

51. Column 2:42–3:33 is the "Summary of the Invention." This summary parrots the claim language, describing one aspect of the invention as a "processing means . . . arranged to set

for the measurement pattern a delay according to the measurement pattern definitions." '019 Patent Col. 3:5–6. This passage provides no further discussion of the processing means. This figure does not disclose an algorithm, or any portion of one, that would be required for the mobile device to carry out the claimed function of "set[ting] for the measurement pattern definition a delay according to the measurement pattern definitions."

52. Column 5:46–6:19 describes Figure 3, which depicts an exemplar measurement pattern definition. Column 5:46–67 describes the parameters used by the network or base station in setting and transmitting the measurement pattern definition to the mobile device (*e.g.*, parameters defining the number of the frame in which the compressed mode is started, the slot in a frame where a gap begins, and the length of the transmission gap, the distance between consecutive gaps, and total time of measurement). This passage does not disclose an algorithm, or any portion of one, that would be required for the mobile device to carry out the claimed function of "set[ting] for the measurement pattern definition a delay according to the measurement pattern definitions."

53. Column 6:1–19 describes the transmission of "monitoring settings" and "compressed mode parameters to be used for the required measurements" from the base station to the mobile device. This passage does not disclose an algorithm, or any portion of one, that would be required for the mobile device to carry out the claimed function of "set[ting] for the measurement pattern definition a delay according to the measurement pattern definitions," which must necessarily occur after the transmission of the measurement pattern definitions.

54. Column 7:4–9:5 describes a preferred embodiment by reference to Figure 5, which depicts "by way of example the defining of measurement parameters for four mobile stations both according to prior art . . . and according to the invention . . . ." '019 Patent, Col. 7:31–35. Both

Figure 5 and the corresponding passage describe the setting of the measurement pattern for various mobile devices and the allocation of different parameters for different mobile devices, but do not describe setting a delay of any kind. This passage does not disclose an algorithm, or any portion of one, that would be required for the mobile device to carry out the claimed function of "set[ting] for the measurement pattern definition a delay according to the measurement pattern definitions."

55. Column 10:14–53 describes the claimed invention by reference to Figure 6, and identifies a "processing means **630**" as an essential component, but does not describe an algorithm for performing the processing. The passage provides that the claimed invention is to be implemented by software in combination with a generic microprocessor, or by unspecified hardware. It states that the "necessary parameters can advantageously be defined on the basis of an algorithm or lookup table." '019 Patent, Col. 10:51–53. This passage does not disclose an algorithm, or any portion of one, that would be required for the mobile device to carry out the claimed function of "set[ting] for the measurement pattern definition a delay according to the measurement pattern definitions."

56. The 6/29/04 Notice of Allowance is a "PART B- FEE(S) TRANSMITTAL" form. Nothing in this document describes how the measurement pattern is received or subsequently processed by the mobile device. The 6/29/04 Notice of Allowance does not disclose an algorithm, or any portion of one, that would be required for the mobile device to carry out the claimed function of "set[ting] for the measurement pattern definition a delay according to the measurement pattern definitions." The 6/29/04 Notice of Allowance is preceded by a Notice of Allowability (purported to be signed on June 27, 2004) which provides a page 2, the Examiner's REASONS FOR ALLOWANCE. Nothing in this document describes how the measurement pattern is received or subsequently processed by the mobile device. The June 27, 2004 Examiner's

REASONS FOR ALLOWANCE do not disclose an algorithm, or any portion of one, that would be required for the mobile device to carry out the claimed function of "set[ting] for the measurement pattern definition a delay according to the measurement pattern definitions."

57. The portions of the specification and prosecution history cited by CCE and its expert, and discussed above, merely disclose parameters, such as the connection frame number (CFN) and transmission gap starting slot number (TGSN) parameters. However, disclosing parameters does not disclose ***how*** to use the parameters to carry out the function: "set[ting] for the measurement pattern definition a delay according to the measurement pattern definitions." The parameters, themselves, are merely inputs to the claimed function.

58. CCE's expert's assertion that the '019 Patent discloses the claimed function of "applying a CFN and TGSN parameter combination specific to the mobile terminal" is conclusory and incorrect. Plaintiff's Claim Construction Brief, Ex. A at 25 (Oct. 30, 2014) [Dkt. No. 277] (emphasis in original). Merely "applying" parameters without any details of how the software or underlying algorithm carries out that "applying" does not disclose even a portion of an algorithm, let alone a sufficient, specific algorithm. Even if one skilled in the art would be able to derive an algorithm that used the disclosed parameters, one skilled in the art would still be uncertain as to ***which*** algorithms were covered by this limitation (*i.e.*, which applications of the parameters). Thus, one of ordinary skill in the art would need to avoid ***all*** applications involving the disclosed parameters in order to ensure they did not practice this limitation.

59. In light of the foregoing, it is my opinion that the '019 Patent specification does not disclose to a person of ordinary skill in the art a specific algorithm for performing the claimed function of "set[ting] for the measurement pattern definition a delay according to the measurement pattern definitions." Thus, Claim 11 is indefinite.

b) "processing means for arranging gaps in a time-slot frame according to the measurement pattern definitions" (Claim 11)

60. I understand that the phrase "the processing means for arranging gaps in a time-slot frame according to the measurement pattern definitions" is a means-plus-function element to be construed in accordance with 35 U.S.C. § 112, ¶ 6.

61. I understand that CCE and Defendants both agree that the claimed function for this means-plus-function element is recited in Claim 11 as "arranging gaps in a time-slot frame according to the measurement pattern definition."

62. In my opinion, the structure corresponding to the function "arranging gaps in a time-slot frame according to the measurement pattern definition" is the "processing means **630**" described in the specification.

63. As discussed above, Column 10:34–41 describes the claimed invention, and identifies a "processing means **630**" as an essential component, but does not describe an algorithm for performing the processing. Element 630 of Figure 6 is depicted as a block labeled "CNTL." '019 Patent, Fig. 6. Element 630 is described elsewhere by reference to its function:

> In block 630, a quality value of the received signal is measured, such as that of the inter-frequency measurement during gaps in compressed mode. The reception level, bit error ratio, SINR ratio (signal/interference+noise ratio), SIR ratio (signal/interference ratio), C/I ratio (carrier/interference ratio) or any other known way of measuring the channel quality).

'019 Patent, Col. 10:1–7.

64. Column 10:42–54 provides that the claimed invention is to be implemented by software in combination with a general purpose microprocessor, or by unspecified hardware. It states that the "necessary parameters can advantageously be defined on the basis of an algorithm or lookup table." '019 Patent, Col. 10:51–53.

65. It is my opinion that a person of ordinary skill in the art would understand that a general purpose microprocessor would need to be programmed to perform a *specific* algorithm in order to perform the function "arranging gaps in a time-slot frame according to the measurement pattern definition." The '019 Patent does not disclose such an algorithm.

66. I understand that CCE alleges that the claimed structure for this means-plus-function element is "a processor, controller, or application specific integrated circuit (10:34–52; Fig. 6) configured to apply transmission gap length (TGL), transmission gap distance (TGD), transmission gap pattern length (TGPL), and/or transmission gap period repetition count (TGPRC) parameters," and cites as support the following portions of the '019 Patent: Abstract, Figures 3–6, 2:42–3:33, 5:46–9:5, and 10:14–53. Corrected Joint Claim Construction and Pre-Hearing Statement, Ex. A at 2 (Sept. 12, 2014) [Dkt. No. 248]. The portions of the specification and prosecution history cited by CCE do not disclose an algorithm, or any portion of one, that would be required to carry out the function of "arranging gaps in a time-slot frame according to the measurement pattern definition."

67. As discussed above, the Abstract describes a method for defining measurements gaps in a wireless telecommunications system. The Abstract also recites that "various delays are defined for the measurements patterns of the terminals so that gaps of different terminals are in substantially different locations in the time-slot frame." The Abstract however does not disclose an algorithm, or any portion of one, that would be required for the mobile device to carry out the claimed function of "arranging gaps in a time-slot frame according to the measurement pattern definition."

68. As discussed above, Figure 3 is a graphical depiction of gaps that were already arranged according to a measurement pattern definition, which is transmitted from the base station

to the mobile device. Figures 4a and 4b disclose prior art "compressed mode measurement parameters"—selection and re-selection mode measurement patterns, respectively, which are transmitted from the base station to the mobile device. Figure 5 depicts "by way of example the defining of measurement parameters for four mobile stations both according to prior art . . . and according to the invention . . . ." '019 Patent, Col. 7:31–35. These figures disclose prior art measurement patterns (or parameters thereof), which are transmitted by the base station to the mobile device. They do not disclose an algorithm, or any portion of one, that would be required for the mobile device to carry out the claimed function of "arranging gaps in a time-slot frame according to the measurement pattern definition," which is necessarily performed after the transmission of the measurement pattern definitions to the mobile device.

69. As discussed above, Figure 6 is a high-level depiction of the radio system, and "describes the parts essential for the invention in a radio network subsystem RNS and user equipment UE." '019 Patent, Col. 9:6–7. The "processing means **630**" is shown in this figure as a block labeled "CNTL," with no explanation of the algorithm implemented by the processing means. This figure does not disclose an algorithm, or any portion of one, that would be required for the mobile device to carry out the claimed function of "arranging gaps in a time-slot frame according to the measurement pattern definition."

70. As discussed above, Column 2:42–3:33 is the "Summary of the Invention." This summary parrots the claim language, describing one aspect of the invention as a "processing means . . . for arranging gaps in a time-slot frame according to a measurement pattern definition . . . ." '019 Patent Col. 3:2–4. This passage provides no further discussion of the processing means, or the algorithm implemented by the processing means. This figure does not disclose an algorithm, or any portion of one, that would be required for the mobile device to carry

out the claimed function of "arranging gaps in a time-slot frame according to the measurement pattern definition."

71. As discussed above, Column 5:46–67 describes Figure 3, which depicts an exemplar measurement pattern definition. Column 5:46–67 describes the parameters used by the network or base station in setting and transmitting the measurement pattern definition to the mobile device (*e.g.*, parameters defining the number of the frame in which the compressed mode is started, the slot in a frame where a gap begins, and the length of the transmission gap, the distance between consecutive gaps, and total time of measurement). This passage does not disclose an algorithm, or any portion of one, that would be required for the mobile device to carry out the claimed function of "arranging gaps in a time-slot frame according to the measurement pattern definition."

72. Column 6:1–19 describes the transmission of "monitoring settings" and "compressed mode parameters to be used for the required measurements" from the base station to the mobile device. This passage does not disclose an algorithm, or any portion of one, that would be required for the mobile device to carry out the claimed function of "arranging gaps in a time-slot frame according to the measurement pattern definition," which must necessarily occur after the transmission of the measurement pattern definitions.

73. Columns 6:20–7:3 describe Figures 4a and 4b. Figures 4a and 4b disclose prior art "compressed mode measurement parameters"—selection and re-selection mode measurement patterns, respectively. As stated in the patent, this passage "describes measurements performed for an internal (inter-frequency) WCDMA system handover as one example of a parameter measurement typical of the WCDMA system in compressed mode." '019 Patent, Col. 6:31–64. This passage does not disclose an algorithm, or any portion of one, that would be required for the

mobile device to carry out the claimed function of "arranging gaps in a time-slot frame according to the measurement pattern definition."

74. As discussed above, Columns 7:31–9:5 describe Figure 5, which depicts "by way of example the defining of measurement parameters for four mobile stations both according to prior art . . . and according to the invention . . . ." '019 Patent, Col. 7:31–35. Both Figure 5 and the corresponding passage describe the setting of the measurement pattern, but do not describe how the measurement pattern is received or subsequently processed by the mobile device. Neither Figure 5 nor this passage discloses an algorithm, or any portion of one, that would be required for the mobile device to carry out the claimed function of "arranging gaps in a time-slot frame according to the measurement pattern definition."

75. Column 10:14–53 describes the claimed invention by reference to Figure 6, and identifies a "processing means **630**" as an essential component, but does not describe an algorithm for performing the processing. The passage provides that the claimed invention is to be implemented by software in combination with a generic microprocessor, or by unspecified hardware. It states that the "necessary parameters can advantageously be defined on the basis of an algorithm or lookup table." '019 Patent, Col. 10:51–53. This passage does not disclose an algorithm, or any portion of one, that would be required for the mobile device to carry out the claimed function of "arranging gaps in a time-slot frame according to the measurement pattern definition."

76. The portions of the specification and prosecution history cited by CCE and its expert, and discussed above, merely disclose parameters, such as the transmission gap length (TGL) parameter, the transmission gap distance (TGD) parameter, the transmission gap pattern length (TGPL) parameter, or the transmission gap period repetition count (TGPRC) parameter.

However, disclosing parameters does not disclose ***how*** to use the parameters to carry out the function: "arranging gaps in a time-slot frame according to the measurement pattern definition." The parameters are merely inputs to the claimed function and do not, themselves, carry out the claimed function.

77. CCE's expert's assertion that the '019 Patent discloses the claimed function of "applying TGL, TGD, TGPL, and/or TGPRC parameters" is conclusory and incorrect. Plaintiff's Claim Construction Brief, Ex. A at 18 (Oct. 30, 2014) [Dkt. No. 277] (emphasis in original). Merely "applying" parameters without any details of how the software or underlying algorithm carries out that "applying" does not disclose even a portion of an algorithm, let alone a sufficient, specific algorithm. Even if one skilled in the art would be able to derive an algorithm that used the disclosed parameters, one skilled in the art would still be uncertain as to ***which*** algorithms were covered by this limitation (*i.e.*, which applications of the parameters). Moreover, the use of "and/or" implies that the alleged algorithm would only need to "apply" one of the identified parameters. Thus, one of ordinary skill in the art would need to avoid ***all*** applications involving ***any*** of the disclosed parameters in order to ensure they did not practice this limitation.

78. In light of the foregoing, it is my opinion that the '019 Patent specification does not disclose to a person of ordinary skill in the art a specific algorithm for performing the claimed function of "arranging gaps in a time-slot frame according to the measurement pattern definition." Thus, Claim 11 is indefinite.

B. The '174 Patent

1. Summary/Background

79. The '174 Patent generally relates to power control associated with transmission of messages using a plurality of assigned codes within a mobile radio communications system.

80. Some mobile radio communications systems, *e.g.*, CDMA, use codes to distinguish different transmission channels that are used to communicate with nearby subscriber stations (*i.e.*, mobile devices). '174 Patent, Col. 2:1–6. In these systems, the subscriber stations are assigned a plurality of codes for the purpose of transmitting messages to the network. '174 Patent, Col. 2:33–34. The '174 Patent describes two codes in particular: DCH and EDCH. '174 Patent, Col. 4:37–40. The DCH code is used to transfer data and maintain the connection between the subscriber station and the base station. '174 Patent, Col. 5:61–6:1. "The code EDCH is intended to be used for transmitting high bit rate data packets to the base station NODE B." '174 Patent, Col. 5:12–13.

81. A subscriber station may transmit messages using not just the DCH code, but both the DCH and the EDCH codes in parallel. '174 Patent, Col. 5:1–4. However, the subscriber station has a maximum transmit power that it cannot exceed. '174 Patent, Col. 4:46–47.

82. A subscriber station can adjust its transmit power for one of its assigned codes through the use of TFCs ("Transport Format Combinations"). '174 Patent, Col. 4:50–67. "For each physical channel the TFC specifies the ratio of coded data … to the payload data, and consequently the data rate. For a given radio channel each TFC is uniquely linked to a transmit power." '174 Patent, Col. 4:55–59.

83. When the radio transmission conditions deteriorate, the base station Node B may instruct the subscriber station to increase its transmit power. '174 Patent, Col. 4:47–50. To increase the transmit power, the subscriber station can switch to a TFC with a higher data rate. However, the TFC for a code cannot be adjusted during the transmission of a message using that same code. Instead, the subscriber station can either increase its transmit power for that code or adjust the TFC used by another code such that the TFC for the first code can be adjusted accordingly at a later point. '174 Patent, Col. 5:31–48.

84. For example, if the subscriber station is transmitting at its maximum transmit power for multiple codes and it receives a request to increase its transmit power for the EDCH code, the subscriber station may adjust the TFC of the transmission using the DCH code. According to the '174 Patent, if the subscriber station cannot adjust the TFC of the transmission using the DCH code, then the subscriber station must abort the transmission using the EDCH code. '174 Patent, Col. 5:54–6:6.

85. In order to avoid the wasted resources resulting from aborted transmissions, the '174 Patent proposes that a subscriber station determine and maintain a "transmit power difference." '174 Patent, Col. 6:40–49. The '174 Patent states that this transmit power difference will "ensure that sufficient scope for increasing the transmit power during the transmission of the EDCH message is present." '174 Patent, Col. 7:24–27.

86. According to the '174 Patent, this "transmit power difference" must be maintained between a specified first transmit power and a specified second transmit power. '174 Patent, Col. 2:41–43. "The first of the two transmit powers is the total maximum transmit power of the subscriber station for the plurality of codes, i.e. the maximum transmit power, when the subscriber station uses the plurality of codes in parallel for transmitting messages." '174 Patent, Col. 2:45–49. "The second of the two transmit powers is the total transmit power of the subscriber station for the plurality of codes at the start of a message transmission using a first of the codes." '174 Patent, Col. 2:59–61. The '174 Patent further describes this "transmit power difference":

> The transmit power difference, which can be termed the "power headroom," is required to exist between the total transmit power for the two codes DCH and EDCH at the start of the transmission of an EDCH message and the maximum transmit power for the two codes DCH and EDCH. The transmit power difference thus corresponds to an unused transmit power at the start of the transmission of an EDCH message.

'174 Patent, Col. 6:42–49.

87. The "transmit power difference" can be determined by the base station Node B, a device controlling the base station Node B, or the subscriber station. '174 Patent, Cols. 8:43–51 (base station), 9:10–14 (Controlling RNC), 9:23–25 (subscriber station).

2. Person of Ordinary Skill in the Art for the '174 Patent

88. I understand that the PCT application filing date of October 6, 2005 qualifies as the U.S. filing date for the application for the '174 Patent. The '174 Patent also claims priority to the filing date of a German application filed on November 11, 2004. For the purpose of this declaration, I was asked to assume the date of the invention for the '174 Patent was the date of the filing of the original German application, November 11, 2004.

89. In determining the characteristics of a hypothetical person of ordinary skill in the art of the '174 Patent as of November 11, 2004, I have considered several things, including that system designers must have a firm knowledge of computer, wireless, and network technologies, yet also understand evolving technology for mobile devices, preferably mobile telephones, to apply the computer, wireless, and network technologies to such systems. I also considered the educational background and experience of those actively working in the field. Finally, I mentally placed myself back in 2004 and considered the engineers that I taught and worked with in the field of this patent.

90. My conclusion is that a person of ordinary skill in the art would have earned a B.S. in computer science, electrical engineering, or a related discipline, plus around two years of experience analyzing, designing, and/or implementing wireless systems, software for mobile computers, and telephony software.

3. Opinion

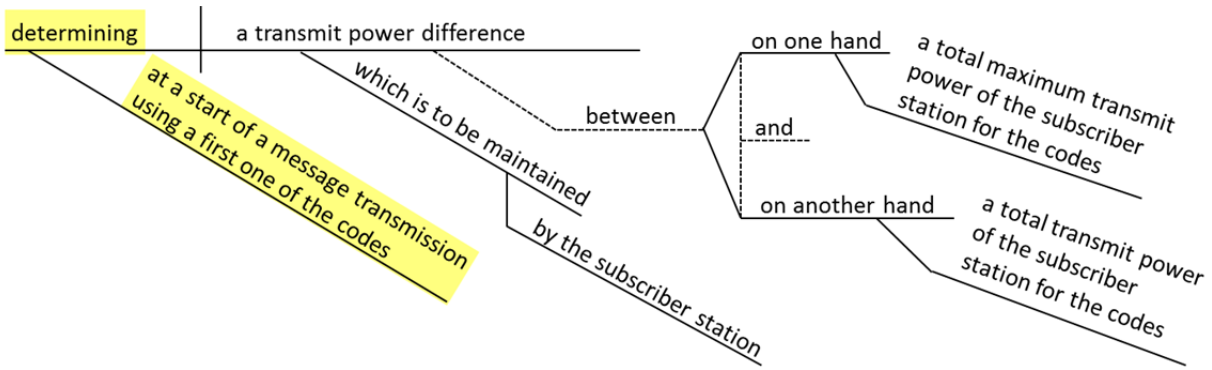
a) "determining a transmit power difference which is to be maintained by the subscriber station between on one hand a total maximum transmit power of the subscriber station for the codes and on another hand a total

transmit power of the subscriber station for the codes at a start of a message transmission using a first one of the codes"

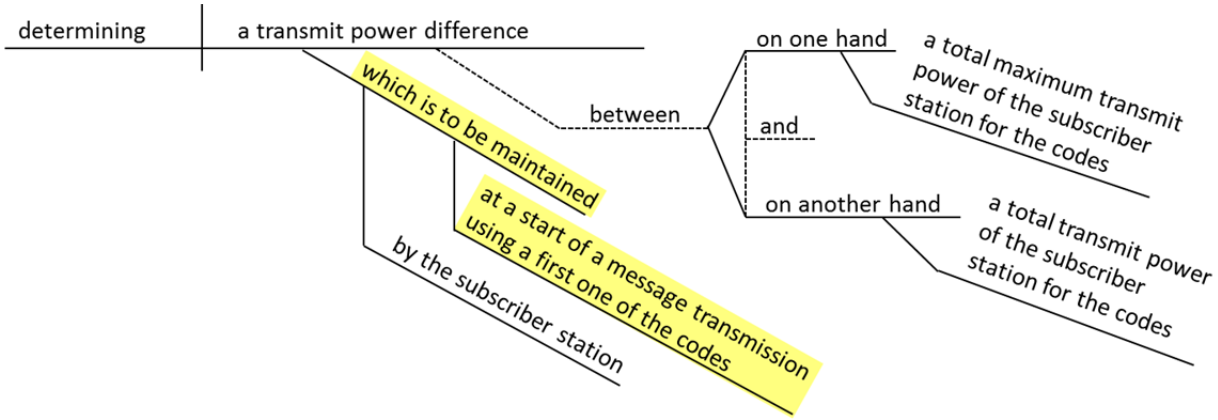
91. I understand that CCE alleges that the limitation "determining a transmit power difference which is to be maintained by the subscriber station between on one hand a total maximum transmit power of the subscriber station for the codes and on another hand a total transmit power of the subscriber station for the codes at a start of a message transmission using a first one of the codes" of Claim 1 does not require construction.

92. It is my opinion that the scope of Claim 1 changes depending on how the "at a start of a message transmission using a first one of the codes" modifier is applied to the limitation "determining a transmit power difference which is to be maintained by the subscriber station between on one hand a total maximum transmit power of the subscriber station for the codes and on another hand a total transmit power of the subscriber station for the codes at a start of a message transmission using a first one of the codes."

93. First, the "at a start of …" modifier could apply to "determining" (*i.e.*, make the determination "at a start of …"). Under this interpretation, the determination of the transmit power difference is made "at a start of a message transmission using a first one of the codes." Additionally, according to the claim, the transmit power difference is the difference between "a total maximum transmit power of the subscriber station for the codes" and "a total transmit power of the subscriber station for the codes." This interpretation is diagramed below:

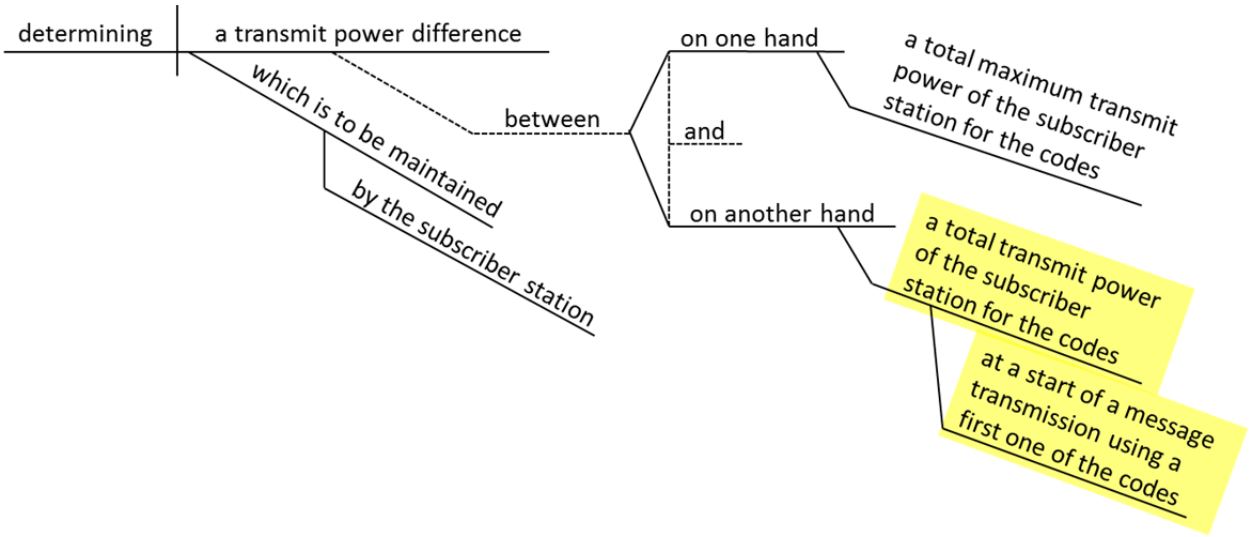


94. Second, the "at a start of …" modifier could also apply to "maintaining" (*i.e.*, begin maintaining "at a start of …"). Like the prior interpretation, the transmit power difference is the difference between "a total maximum transmit power of the subscriber station for the codes" and "a total transmit power of the subscriber station for the codes." However, in this interpretation, the maintaining of the transmit power difference begins "at a start of a message transmission using a first one of the codes." This interpretation means that the transmit power difference would be determined prior to the start of a message transmission using a first one of the codes such that the transmit power difference can be maintained at the start of a message transmission using a first one of the codes. This interpretation is diagramed below:



95. Third, the "at a start of …" modifier could apply to the "total transmit power of the subscriber station for the codes" (*i.e.*, the value of the total transmit power "at a start of …"). Unlike the first two interpretations, the "determining" and "maintaining" events are not temporally

limited by the "at the start of …" modifier. For example, the "determining" and "maintaining" could both occur *after* the start of a message transmission using a first one of the codes. The transmit power difference, however, is calculated as the difference between "a total maximum transmit power of the subscriber station for the codes" and "a total transmit power of the subscriber station for the codes at a start of a message transmission using a first one of the codes." The second value, "a total transmit power of the subscriber station for the codes at a start of a message transmission using a first one of the codes," may be the total transmission power for all of the codes, but only if messages are transmitted for all of the codes at the start of a message transmission using the first code. For example, the second value, "a total transmit power of the subscriber station for the codes at a start of a message transmission using a first one of the codes," may also be just the total transmission power of the first code if there is no transmission using the remaining code(s) when the "transmission using a first one of the codes" commences. Thus, unlike the first two interpretations, the scope of "a total transmit power of the subscriber station for the codes" may vary depending on the transmissions that occur at the start of a message transmission using a first one of the codes. This interpretation is illustrated below:



96. The specification provides support for each of the competing interpretations described above. *See e.g.*, '174 Patent at Abstract, Claim 9, 2:17–23; 2:41–3:4, 3:52–59, 6:11–15, 6:40–7:3, 7:6–28, 7:54–8:7, 8:50–63, 9:23–46.

97. Each of the interpretations described above changes the scope of the claimed invention. Likewise, the features in an infringing instrumentality that would be relevant are different for each of these interpretations. Thus, the claim, when read in light of the specification and the prosecution history, fails to inform with reasonable certainty persons of ordinary skill in the art about the scope of the invention.

98. For the same reasons as stated above, Claims 9 and 18, when read in light of the specification and the prosecution history, fail to inform with reasonable certainty persons of ordinary skill in the art about the scope of the invention.

C. The '820 Patent

1. Summary/Background

99. The '820 Patent relates to a system and methods of allocating network resources in cellular communications systems. In order for the network to understand the demands of various mobile devices, a data buffer status reporting scheme is used to inform the network of the needs of each device. This type of network allocation was well known by the purported invention date and the '820 Patent, by its own admission, is directed to system and methods for increasing buffer status reporting efficiency. '820 Patent, Abstract.

100. In the communications systems of the '820 Patent, each of the mobile devices is capable of two distinct types of buffer status reports. The '820 Patent describes these formats as the "long buffer status reporting format" and the "short buffer status reporting format." '820 Patent, Col. 1:53–55. The claimed improvement to prior art systems is a more flexible and efficient method for communicating buffer status reports. '820 Patent, Col. 1:22–30.

101. One exemplar embodiment of the invention as a whole that is found within the '820 Patent is illustrated by Figure 4 and its associated explanation.

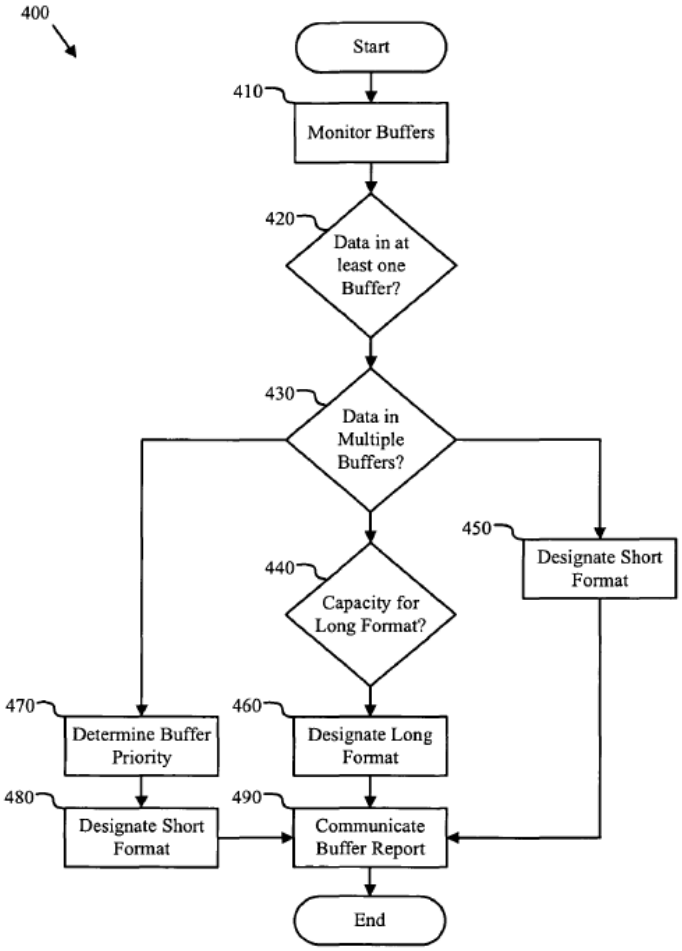


FIG. 4

102. Figure 4, illustrated above, and associated description, requires the mobile device to monitor its data buffers to see if they have data to send to the network. If only one buffer has data, the mobile device designates the short buffer status report. '820 Patent, Col. 8:23–25. When the mobile device has data in multiple buffers, it checks to see if there is capacity to send the long format report. If there is capacity, it sends the long report; if not, it sends the short report designating the highest priority buffer. '820 Patent, Col. 8:29–39.

103. An alternate embodiment is additionally described in the '820 Patent where the total size of the uplink grant is used as the metric for determining which report will be used. In this embodiment, when there is data in more than one buffer and the size of the grant is large enough, the long report is sent. If not, the short report is sent designating the highest priority buffer. '820 Patent, Col. 10:29–44.

2. Person of Ordinary Skill in the Art for the '820 Patent

104. I understand that the '820 Patent also claims priority under U.S. Provisional Application No. 60/996,168, which was filed on November 5, 2007. For the purpose of this declaration, I was asked to assume the date of the invention for the '820 Patent was the date of the filing of the provisional application, November 5, 2007.

105. In determining the characteristics of a hypothetical person of ordinary skill in the art of the '820 Patent as of November 5, 2007, I have considered several things, including that system designers must have a firm knowledge of computer, wireless, and network technologies, yet also understand evolving technology for mobile devices, preferably mobile telephones, to apply the computer, wireless, and network technologies to such systems. I also considered the educational background and experience of those actively working in the field. Finally, I mentally placed myself back in 2007 and considered the engineers that I taught and worked with in the field of this patent.

106. My conclusion is that a person of ordinary skill in the art would have earned a B.S. in computer science, electrical engineering, or a related discipline, plus around two years of experience analyzing, designing, and/or implementing wireless systems, software for mobile computers, and telephony software.

3. Prosecution History

107. The patentee filed U.S. Patent Application 12/289,825 ("the '825 Application") on November 5, 2008. During prosecution, the Examiner rejected all claims of the pending application based on *Wu* (U.S. Patent No. 7,796,926). In the patentee's response on December 12, 2010, the patentee amended the claims by combining each of the independent claims with limitations previously claimed in two dependent claims, one of which added the limitation that "designate[s] the long buffer status reporting format when there is sufficient uplink capacity to communicate using the long buffer status reporting format." Claims 1, 4, and 6, as originally filed, appear in the table below next to Claim 6, as amended:

1. A method, comprising:	6. (Currently Amended) A method, comprising:
monitoring a usage of a plurality of buffers;	monitoring a usage of a plurality of buffers;
detecting one of a plurality of pre-selected conditions corresponding to the plurality of buffers;	detecting one of a plurality of pre-selected conditions corresponding to the plurality of buffers;
designating one of a plurality of buffer status reporting formats depending on the pre-selected condition detected;	designating one of a plurality of buffer status reporting formats ***comprising a long buffer status reporting format and a short buffer status reporting format*** depending on the pre-selected condition detected;
and communicating a buffer status report to a network device in accordance with the buffer status reporting format designated.	and communicating a buffer status report to a network device in accordance with the buffer status reporting format designated,
4. The method of claim 1,	
wherein the plurality of buffer status reporting formats ***comprises a long buffer status reporting format and a short buffer status reporting format***.	
6. The method of claim 4,	
wherein the designating unit is configured to only ***designate the long buffer status reporting format when there is sufficient uplink capacity to communicate using the long buffer***	***wherein the designating designates the long buffer status reporting format when there is sufficient uplink capacity to communicate using the long buffer status reporting format***.

status reporting format.	

Compare '825 Application, Specification 22–23 (Nov. 5, 2008), with '825 Application, Response to Office Action 3–4 (Dec. 12, 2010).

4. Opinion

a) "wherein the designating designates the long buffer status reporting format when there is sufficient uplink bandwidth to communicate using the long buffer status reporting format" (Claims 1 and 24); "wherein the designating unit is configured to designate the long buffer status reporting format when there is sufficient uplink bandwidth to communicate using the long buffer status reporting format" (Claim 12)

108. I understand that CCE alleges that the limitations "wherein the designating designates the long buffer status reporting format when there is sufficient uplink bandwidth to communicate using the long buffer status reporting format" of Claim 1 and "wherein the designating unit is configured to designate the long buffer status reporting format when there is sufficient uplink bandwidth to communicate using the long buffer status reporting format" do not require construction.

109. It is my opinion that independent Claims 1, 12, and 24 of the '820 Patent are vague and indefinite to one of ordinary skill. Independent Claims 1, 12, and 24 are provided below:

1. A method, comprising:	12. An apparatus, comprising: a processor; and a memory including computer program code, the memory and the computer program code configured to, with the processor, cause the apparatus at least to	24. A non-transitory computer-readable medium encoded with a computer program configured to control a processor to perform operations comprising:
monitoring a usage of a plurality of buffers;	monitor a usage of a plurality of buffers;	monitoring a usage of a plurality of buffers;
detecting one of a plurality of pre-selected conditions corresponding to the plurality of buffers;	detect one of a plurality of pre-selected conditions corresponding to the plurality of buffers;	detecting one of a plurality of pre-selected conditions corresponding to the plurality of buffers;

designating one of a plurality of buffer status reporting formats comprising a long buffer status reporting format and a short buffer status reporting format depending on the pre-selected condition detected; and	designate one of a plurality of buffer status reporting formats comprising a long buffer status reporting format and a short buffer status reporting format depending on the pre-selected condition detected; and	designating one of a plurality of buffer status reporting formats comprising a long buffer status reporting format and a short buffer status reporting format depending on the pre-selected condition detected; and
communicating a buffer status report to a network device in accordance with the buffer status reporting format designated,	communicate a buffer status report to a network device in accordance with the buffer status reporting format designated,	communicating a buffer status report to a network device in accordance with the buffer status reporting format designated,
wherein the designating designates the long buffer status reporting format when there is sufficient uplink bandwidth to communicate using the long buffer status reporting format.	wherein the designating unit is configured to designate the long buffer status reporting format when there is sufficient uplink bandwidth to communicate using the long buffer status reporting format.	wherein the designating designates the long buffer status reporting format when there is sufficient uplink bandwidth to communicate using the long buffer status reporting format.

110. Taking Claim 1 as exemplary of the difficulty presented to one of ordinary skill, the following element would require the designation of either the short or long report based on a condition: "designating one of a plurality of buffer status reporting formats comprising a long buffer status reporting format and a short buffer status reporting format depending on the pre-selected condition detected."

111. As described above, one of the pre-selected conditions described in the '820 Patent is the presence of data in either one or multiple buffers. To meet this claim element, the mobile device must be capable of designating the short report depending on this pre-existing condition.

112. The wherein clause of Claim 1 goes on to require the following: "wherein the designating designates the long buffer status reporting format when there is sufficient uplink bandwidth to communicate using the long buffer status reporting format."

113. It is unclear to a person of ordinary skill how to reconcile this with the earlier limitation in Claim 1 where the designation is dependent upon the "pre-selected condition." The addition of this limitation could lead to the designation of a long report because there is sufficient uplink bandwidth to send a long report, despite data residing in a single buffer.

114. As discussed above, the patentee combined the independent claims with a couple of dependent claims during prosecution to avoid the Examiner's rejection. When the patentee amended the claims, the patentee changed "wherein the designating unit is configured to only designate the long buffer status reporting format when…" to "wherein the designating designates the long buffer status reporting format when…." This was a substantive amendment that changed the scope of the limitation. After the amendment, this limitation became apathetic to the claim's earlier designation limitation. As a result of the amendment, Claim 1 imposes directly conflicting operations, as described above, without any hope of reconciling the inconsistency.

115. Thus, Claim 1, when read in light of the specification and the prosecution history, fails to inform with reasonable certainty persons of ordinary skill in the art about the scope of the invention. It is therefore my opinion that one of ordinary skill would not understand Claim 1 and it should be found vague and indefinite.

116. For the same reasons as stated above, Claims 12 and 24, when read in light of the specification and the prosecution history, fail to inform with reasonable certainty persons of ordinary skill in the art about the scope of the invention.

b) <u>"designating unit" (Claim 12)</u>

117. I understand that CCE alleges that the limitation "the designating unit" of Claim 12 is not subject to 35 U.S.C. § 112, ¶ 6 and should be construed as, or corrected to state, "the memory, processor, and computer program code configured to designate."

118. It is my opinion that a person of skill in the art would not understand the term "designating unit," as found in Claim 12, as designating a structure, or even a broad class of structures.

119. First, considering the term "unit" in isolation, this term is not used in common parlance by persons of skill in the art to designate a structure or even a broad class of structures. "Unit" is a generic term that can refer to almost any conceivable element in a communications system, and thus provides no information to a person of skill in the art as to what particular structure or class of structures is contemplated.

120. Second, the modifier "designating" before the word "unit" does not provide sufficient additional descriptive information to convey a structure, even a broad class of structures, to persons of skill in the art. The term "designating unit" is not commonly used in the communications field and has no generally known or accepted structural meaning or implication. These words would therefore convey to a person of ordinary skill in the communications field, nothing more than some unknown, generic module, that is, a "unit," that performs some sort of general "designating" function.

121. Third, the statement in Claim 12 that the "designating unit" "is configured to designate the long buffer status reporting format when there is sufficient uplink bandwidth to communicate using the long buffer status reporting format" does not denote structure, even a broad class of structures, to a person of ordinary skill in the art, nor does it provide a person of skill with any meaningful information about or limitation as to what structure may perform this function. Rather, this function could be performed by an essentially unbounded set of possible structures. For instance, it could be performed by any number of combinations of hardware and software, such as a microprocessor programmed with an essentially unlimited set of algorithms. It could

also be performed by a virtually unbounded set of hardware elements, such as any appropriate group of logic gates.

122. The '820 Patent's specification confirms my opinion based on the claims. Specifically, the term "the designating unit" is used in the specification not to designate any structure, or class of structures to a person of ordinary skill, but rather as a generic construct that can encompass any element that is configured to perform the claimed operation. For instance, this is consistent with the fact that the '820 Patent describes "units" as "functional," stating that "[m]any of the functional units described in this specification have been labeled as units, in order to more particularly emphasize their implementation independence." '820 Patent, Col. 7:13–15. In my opinion, a person of skill in the art would understand this reference to "functional units" and the "implementation" independence of "units" to mean that the term "units" is intended to be a generic "nonce" word that encompasses any conceivable structure that could perform the recited function or acts.

123. The '820 Patent's description of "the designating unit 260" also does not disclose structure or algorithm for the "designating unit." '820 Patent, Col. 6:10–36. This portion of the specification states "the designating unit 260 is configured to designate one of a plurality of buffer status reports." '820 Patent, Col. 6:10–11. The specification further recites that "the uplink capacity unit 240 may cooperate with the designating unit 260 to ascertain the appropriate buffer status reporting format. . . the format proposed by the designating unit 260 will exceed the uplink capacity." '820 Patent, Col. 6:23–27. In my opinion, a person of skill in the art would understand these statements describe the function of the designating unit and disclose a possibility of cooperation between the designating unit and the uplink capacity unit. They do not disclose a structure or algorithm for the designating unit to a person of skill in the art.

124. Moreover, the fact that the '820 Patent broadly states that a "unit" can be implemented using a hardware circuit, programmable hardware device, and/or software, would confirm to a person of ordinary skill in the art that the term does not connote a structure or class of structures. '820 Patent, Col. 7:13–36; *see* '825 Application, Response to Office Action 11 (Dec. 2, 2010). A person of skill in the communications field would recognize that the categories of hardware, programmable hardware, and software together encompass essentially every conceivable mechanism or structure for performing the "designating" referred to in Claim 12. This is particularly true given the patent's expansive descriptions of what each of these categories can comprise. For instance, the '820 Patent states that a hardware "unit" can comprise "custom VLSI circuits or gate arrays, off-the-shelf semiconductors such as logic chips, transistors, or other discrete components." '820 Patent, Col. 7:15–22. Similarly, the '820 Patent states that "units may also be implemented in software" and that that software can include "one or more physical or logical blocks of computer instructions which may, for instance, be organized as an object, procedure, or function," that "the executables of an identified unit need not be physically located together, but may comprise disparate instructions stored in different locations," that "a unit of executable code may be a single instruction, or many instructions" and "may be embodied in any suitable form and organized within any suitable type of data structure." '820 Patent, Col. 7:23–40.

125. The specification refers to Element 260 in Figure 2 as an example of the "designating unit." Specifically, Figure 2 includes a plain rectangular box that is part of a block diagram and is labeled "Format Designating Unit 260." '820 Patent, Fig. 2. In my opinion and experience, boxes with text labels of this kind are used in the communications field to designate generic elements or physical/logical modules, and convey no particular structure, or class of structures, to a person of skill in the art.

126. I also considered, assuming that the term "designating unit" was subject to § 112, ¶ 6, whether the specification clearly links or associates, to a person of ordinary skill in the art, any structure or a class of structures with the function of "designat[ing] the long buffer status reporting format when there is sufficient uplink bandwidth to communicate using the long buffer status reporting format." After reviewing the '820 Patent, my opinion is that it does not clearly link any structure or class of structures—either in the form of hardware or software or a combination thereof—with the function. At a minimum, this is because there is no disclosure in the '820 Patent that describes this function as being performed by any structure or class of structures.

127. I understand that CCE claims the physical components: a VLSI circuit, semiconductor, or processor can each be the structure of the designating unit. Plaintiff's Claim Construction Brief, Ex. A at 40 (Oct. 30, 2014) [Dkt. No. 277]. It is my opinion that these structures are only generic structure for which an algorithm is required to perform the claimed function.

128. I further understand that CCE asserts that Figures 2–4 (and accompanying description) disclose an algorithm. It is my opinion that Figures 2–4 (and accompanying description) do not disclose an algorithm to perform the claimed function.

129. In my review of the '820 Patent, I noted a single reference to an embodiment of the invention that discloses "a computer-readable medium encoded with a computer program configured to control a processor to perform operations" that includes "designating one of a plurality of buffer status reporting formats." '820 Patent, Col. 4:26–47. As discussed above, I understand that a computer-implemented algorithm, run on a processor, may in some cases provide a corresponding structure for a means-plus-function element. Here, however, the specification does not contain what a person of ordinary skill in the communications field would

understand is an algorithm that would perform the function of "designat[ing] the long buffer status reporting format when there is sufficient uplink bandwidth to communicate using the long buffer status reporting format." '820 Patent, Col. 12:3–6.

130. I have considered the disclosure in Figure 2 and the accompanying description in the specification. However, this is an embodiment of the whole of the patented invention, and not an algorithm for the function performed by the "designating unit." Figure 2 includes a plain rectangular box that is part of a block diagram and is labeled "Format Designating Unit 260." '820 Patent, Fig. 2. In my opinion and experience, boxes with text labels of this kind are used in the communications field to designate generic elements or physical/logical modules, and convey no particular algorithm to a person of skill in the art.

131. I have considered the disclosure in Figure 3 and the accompanying description in the specification. However, this is an embodiment of the whole of the patented invention, and not an algorithm for the function performed by the "designating unit." Figure 3 of the '820 Patent Figure 3 does not show a "designating unit." My opinion is that at most, a person of skill in the art may extrapolate that Element 330, "Designate Format" is performed by what Claim 12 calls "the designating unit." A person of ordinary skill in the art would find that nothing about Element 330 discloses an algorithm to perform the claimed function.

132. I have considered the disclosure in Figure 4 and the accompanying description in Col. 8:6–39. However, this is an embodiment of the whole of the patented invention, and not an algorithm for the function performed by the "designating unit." The "designating" function at issue is represented by block 460, but the specification does not disclose an algorithm for how this particular function is achieved.

133. In light of the foregoing, it is also my opinion that the '820 Patent specification does not disclose to a person of ordinary skill in the art a specific algorithm for the claimed function performed by the "designating unit."

134. I understand that CCE's expert Dr. Dinan has opined that one of skill in the art would interpret "the designating unit" to refer to "that part of the claimed apparatus that is configured to 'designate' (i.e., the memory, the processor, and computer program code configured to designate)." Plaintiff's Claim Construction Brief, Ex. A at 41 (Oct. 30, 2014) [Dkt. No. 277].

135. It is my opinion that a person of skill in the art would not understand "the designating unit" to be "the memory, processor, and computer program code configured to designate" because that phrase "the memory, processor, and computer program configured to designate" does not exist as a whole in the claims and furthermore is not linked to "the designating unit."

136. In my opinion a person of skill in the art would only understand "the designating unit" to mean "the memory, processor, and computer program configured to designate" if the claim was redrafted to replace "the designating unit" with that phrase.

137. It is also my opinion that one skilled in the art would not understand the entirety of the group "the memory, processor, and computer program code" to be "the designating unit," particularly because "the memory and the computer program code [], with the processor" are configured to "***cause the apparatus to monitor. . . detect. . . designate. . . and communicate***." Thus, the language of the claim conveys that the ***apparatus*** is performing the step of "designat[ing]."

138. It is also my further opinion that because the apparatus is configured to perform all the steps listed above, that is, "to monitor. . . detect. . . designate. . . and communicate," a person of

skill in the art reading Claim 12 in light of the specification would understand that "the designating unit" performs the "designate" step.

139. It is my opinion that because the specification does not clearly link sufficient structure to perform the function performed by the "designating unit," Claim 12 is indefinite.

D. The '9923 Patent

1. Summary/Background

140. The '9923 Patent generally relates to the transmission of a list or message containing neighboring cell information in a cellular telecommunications system, and specifically to a particular way of compressing this message before it is sent to a mobile station (*i.e.*, mobile device). The '9923 Patent acknowledges that it was well-known for a telecommunications network to transmit lists of neighbor cells to mobile devices. '9923 Patent, Col. 1:15–25. The mobile device can then use this list of neighbor cells to communicate with new base stations.

141. In order to reduce the time and resources required to communicate the neighbor cell information message, the '9923 Patent suggests storing redundant values in the neighbor cell message in a table or other data structure, and replacing the redundant values in the message with a reference, such as a pointer or index, to the table or data structure. The '9923 Patent describes further compression techniques where the neighbor cell information list is compressed by expressing a first parameter value in the normal way, but expressing further parameter values relative to the first parameter value, or relative to a previous parameter value. '9923 Patent, Col. 2:22–26.

2. Person of Ordinary Skill in the Art for the '9923 Patent

142. I understand that the PCT application filing date of December 16, 1999 qualifies as the U.S. filing date for the application for the '9923 Patent. The '9923 Patent also claims priority to the filing date of a Finnish application filed on December 16, 1998. For the purpose of this

declaration, I was asked to assume the date of the invention for the '9923 Patent was the date of the filing of the original Finnish application, December 16, 1998.

143. In determining the characteristics of a hypothetical person of ordinary skill in the art of the '9923 Patent as of December 16, 1998, I have considered several things, including that system designers must have a firm knowledge of computer, wireless, and network technologies, yet also understand evolving technology for mobile devices, preferably mobile telephones, to apply the computer, wireless, and network technologies to such systems. I also considered the educational background and experience of those actively working in the field. Finally, I mentally placed myself back in 1998 and considered the engineers that I taught and worked with in the field of this patent.

144. My conclusion is that a person of ordinary skill in the art would have earned a B.S. in computer science, electrical engineering, or a related discipline, plus around two years of experience analyzing, designing, and/or implementing wireless systems, software for mobile computers, and telephony software.

3. Prosecution History

145. The patentee filed U.S. Patent Application 09/831,689 ("the '689 Application") on June 12, 2001. As discussed above, the '689 Application claims priority to PCT Application PCT/FI99/01048, which was filed on December 16, 1999. The PCT Application, in turn, claims priority to Finnish Application 982726, which was filed on December 16, 1998.

146. The '689 Application was filed with Claims 1–11 taken from the underlying PCT Application.

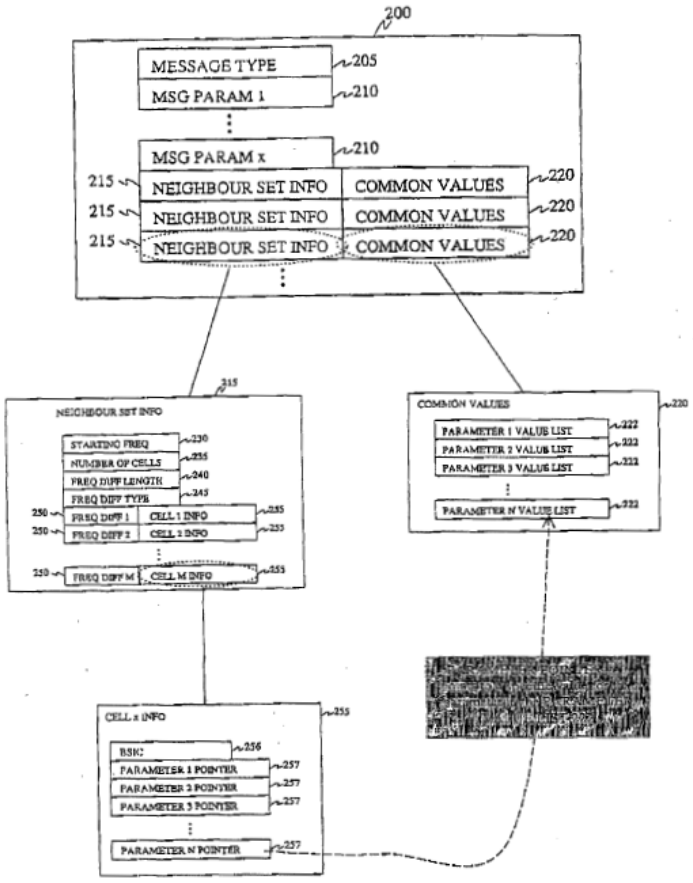
147. On September 15, 2003, the Examiner rejected all of the claims. Claims 1–6 and 9–11 were rejected as obvious over *Abbadessa* (U.S. Patent No. 6,192,244) in view of *Meskanen*

(U.S. Patent No. 6,434,389). Claims 7–8 were rejected as obvious over *Abbadessa* and *Meskanen* in view of *Rinne* (U.S. Patent No. 6,201,966).

148. On December 15, 2003, the patentee responded to the Examiner's rejections and added 9 new claims. In response to the rejections, the patentee argued that the *Meskanen* reference was not prior art. Moreover, the patentee amended the claims to avoid the other prior art references the Examiner relied upon. The patentee admitted the state of the prior art included base stations in cellular telecommunications systems transmitting information regarding nearby cells to the mobile device in a "neighbor cell information message." Thus, the patentee admitted that the claimed invention was directed to an improvement of neighbor cell information messages. '689 Application, Response to Office Action 11 (Dec. 15, 2003). The patentee argued that the present invention reduced the size of the neighbor cell information message by identifying specific values of one or more cell parameters, where these specific values are common to more than one of the neighbor cells. Because these specific parameter values are common, a pointer or an index or some other shortened form of indication may be used to indicate one of the specific values, without having to reproduce the specific value in its entirety. According to the patentee, the cited prior art did not "(i) identif[y] common parameter values, (ii) output[] a list of the identified common parameters, and then (iii) indicate[] those common parameters values in neighbor cell information messages by referring to the list, rather than repeating the entire actual value of the common parameter values." '689 Application, Response to Office Action 12 (Dec. 15, 2003).

149. On February 3, 2004, the Examiner again rejected all of the claims. The Examiner rejected Claim 10 as being indefinite. Claims 1–6 and 9–20 were rejected as obvious over *Abbadessa* in view of *Wallentin* (U.S. Patent No. 6,188,911). Claims 7–8 were rejected as obvious over *Abbadessa* and *Wallentin* in view of *Rinne*.

150. In order to clarify the format of the neighbor cell information message, the patentee also presented a rearrangement of Figures 2–5, and included additional markings to illustrate the relationships between these figures. '689 Application, Response to Office Action 9 (May 3, 2004). The patentee's submission is reproduced below:



'689 Application, Response to Office Action 10 (May 3, 2004). The patentee explained: "The present invention relies on the probability that a particular parameter of two or more neighboring cells will have the same value, e.g., that two or more cells will have the parameter value of '855,678.09'. However, those common parameter values must first be identified and output, in order that a neighbor cell information message using pointers/indices as shown below can be generated. Independent Claim l recites those steps." '689 Application, Response to Office Action 11 (May 3, 2004).

151. On July 8, 2004, the Examiner issued the Notice of Allowance. With the Notice of Allowance, the Examiner noted that "Claims 1–20 [w]ere allowed based on Abbadessa in view of Wallentin et al." '689 Application, Notice of Allowance 2 (July 8, 2004).

4. Opinion

a) "means for associating a specific value of said set of specific parameter values indicated by one of said index with the corresponding second parameter of a neighbor cell"

152. I understand that the "means for associating a specific value of said set of specific parameter values indicated by one of said index with the corresponding second parameter of a neighbor cell" is a means-plus-function element to be construed in accordance with 35 U.S.C. § 112, ¶ 6.

153. I understand that CCE and the Defendants both agree that the claimed function for this means-plus-function element is recited in Claim 11 as "associating a specific value of said set of specific parameter values indicated by one of said index with the corresponding second parameter of a neighbor cell."

154. As discussed above, I understand that the corresponding structure for a means-plus-function element for a computer-implemented function includes the algorithm disclosed in the specification, if any.

155. I understand that CCE alleges that the claimed structure for this means-plus-function element is "a microprocessor (6:57–61; Fig. 7) configured to use a parameter (or set of parameters) specified by an index (or pointer) for a parameter of a neighbor cell (2:15–28; 2:35–43; 3:4–26; 4:11–5:17; 5:35–46; 7:39–49; Figs. 2–5), and equivalents thereof."

156. The '9923 Patent explicitly identifies the structure for "associating a specific value of said set of specific parameter values indicated by one of said index with the corresponding second parameter of a neighbor cell" as "means 420," which is included in Figure 7. '9923 Patent,

Col. 6:51–54. Means 420 is the only component that the specification of the '9923 Patent links to and associates with the recited function of "associating a specific value of said set of specific parameter values indicated by one of said index with the corresponding second parameter of a neighbor cell." '9923 Patent, Col. 6:40–54. The '9923 Patent explains that means 420 is software executed by a microprocessor:

> Preferably the means 410 and 420 are realized ***using software programs*** stored in a memory element of a control block 490 of the mobile communication means 10, the programs being executed by a microprocessor of the control block 490.

'9923 Patent, Col. 6:57–61 (emphasis added). Neither the required software nor the underlying algorithm are disclosed by the '9923 Patent.

157. Column 2:15–28 merely describes how the list of neighbor cell information is communicated to the mobile device in a compressed form. This passage does not disclose an algorithm, or any portion of one, that the mobile device could use to carry out the claimed function of "associating a specific value of said set of specific parameter values indicated by one of said index with the corresponding second parameter of a neighbor cell."

158. Column 2:35–43 merely describes the construction of the neighbor cell information message. This passage does not disclose an algorithm, or any portion of one, that the mobile device could use after receiving the neighbor cell information message to carry out the claimed function of "associating a specific value of said set of specific parameter values indicated by one of said index with the corresponding second parameter of a neighbor cell."

159. Column 3:4–26 merely describes the compression of the neighbor cell information. This passage does not disclose an algorithm, or any portion of one, to carry out the claimed function of "associating a specific value of said set of specific parameter values indicated by one of said index with the corresponding second parameter of a neighbor cell."

160. Column 4:11–5:17 merely describes the data structures for the "neighboring cell information message 200," the "NEIGHBOR SET INFO field 215," the "COMMON VALUES field 220," and the "CELLxINFO field 225" of the neighbor cell information message. Figures 2–5 illustrate these data structures. This passage and accompanying figures do not disclose an algorithm, or any portion of one, to carry out the claimed function of "associating a specific value of said set of specific parameter values indicated by one of said index with the corresponding second parameter of a neighbor cell."

161. Column 5:35–46 describes the PARAMETERxPOINTER field. This passage does not disclose an algorithm, or any portion of one, to carry out the claimed function of "associating a specific value of said set of specific parameter values indicated by one of said index with the corresponding second parameter of a neighbor cell."

162. Column 7:39–49 lists various parameters that may be included in the neighbor cell information message. This passage does not disclose an algorithm, or any portion of one, to carry out the claimed function of "associating a specific value of said set of specific parameter values indicated by one of said index with the corresponding second parameter of a neighbor cell."

163. Notably, the passages that CCE identified focus on either the compressed format of the neighbor cell information message or the construction of the compressed neighbor cell information message *before* it is transmitted to the mobile communications means. These passages are silent as to the events *after* the neighbor cell information message has been compressed and transmitted to the mobile communications means. Among other things, there is no discussion regarding how the compressed information is later accessed, stored, and/or returned to an uncompressed state. Thus, CCE has failed to identify an algorithm disclosed in the '9923 Patent to carry out the claimed function of "associating a specific value of said set of specific

parameter values indicated by one of said index with the corresponding second parameter of a neighbor cell," and indeed there is none.

164. The specification discloses only the following regarding an implementation of the alleged invention: "According to the invention, a mobile communication means 10 further comprises at least … means 420 for associating a value of said set of parameter values indicated by one of said second values with the corresponding parameter of a neighbor cell." '9923 Patent, Col. 6:41–54. "Preferably the means 410 and 420 are realized using software programs stored in a memory element of a control block 490 of the mobile communication means 10, the programs being executed by a microprocessor of the control block 490." '9923 Patent, Col. 6:57–61. These passages confirm that the claimed function of "associating a specific value of said set of specific parameter values indicated by one of said index with the corresponding second parameter of a neighbor cell" is carried out using software based on one or more algorithms, which are executed by the identified "microprocessor of the control block 490." These are the only passages that link the claimed function to a physical structure, but the associated structure is merely a generic microprocessor. No accompanying algorithm is disclosed, either in these passages or elsewhere in the specification.

165. The prosecution history further reveals the deficient teachings of the specification. In order to clarify the disclosure of the format of the neighbor cell information message, the patentee provided a figure to the Examiner to illustrate the relationship between Figures 2–5 of the patent. '689 Application, Response to Office Action 10 (May 3, 2004). The patentee's figure contained Figures 2–5 along with additional annotations to link these figures. However, the data tables illustrated in Figures 2–5 do not provide the requisite algorithm.

166. The discussion of an "index" or "pointer" in the '9923 Patent specification does not disclose an algorithm because a person of ordinary skill in the art would know that there are many different ways that an index or pointer can be used to refer to a specific value. However, the '9923 Patent specification does not disclose any specific way that an index or pointer may be implemented. Furthermore, a person of ordinary skill in the art would know that a message containing an index or pointer can be interpreted or processed in a number of ways to determine what the index or pointer refers to, but the '9923 Patent specification does not disclose any specific way of interpreting or processing an index or pointer. Because the terms "index" and "pointer" refer to general concepts, they do not disclose an algorithm.

167. The portions of the specification and prosecution history cited by CCE and its expert, and discussed above, merely disclose the content of the "neighbor cell information message" that is received by the "means for receiving." However, disclosing the content of the "neighbor cell information message" does not disclose ***how*** to use, access, or associate the information ***within*** the "neighbor cell information message."

168. CCE's expert's assertion that the '9923 Patent discloses the claimed function of "by ***using*** the parameter (or set of parameters) specified by the index (or pointer) for the parameter of a neighbor cell" is conclusory and incorrect. Plaintiff's Claim Construction Brief, Ex. A at 34 (Oct. 30, 2014) [Dkt. No. 277] (emphasis in original). Merely "using" a parameter without any details of how the software or underlying algorithm carries out that "using" does not disclose even a portion of an algorithm, let alone a sufficient, specific algorithm.

169. Contrary to CCE's expert's assertion, one of ordinary skill in the art would not find the "algorithm [to be] apparent from the claim language." Plaintiff's Claim Construction Brief, Ex. A at 34 (Oct. 30, 2014) [Dkt. No. 277]. Instead, one of ordinary skill in the art would look to

the specification to determine the structure (algorithm) clearly linked to the claimed function. As discussed above, one of ordinary skill would be uncertain as to the scope of the means-plus-function element because sufficient structure was not disclosed.

170. In light of the foregoing, it is my opinion that the '9923 Patent specification does not disclose to a person of ordinary skill in the art a specific algorithm for performing the claimed function of "associating a specific value of said set of specific parameter values indicated by one of said index with the corresponding second parameter of a neighbor cell." Thus, Claim 11 is indefinite.

b) "means for receiving a neighbor cell information message"

171. I understand that the "means for receiving a neighbor cell information message" is a means-plus-function element to be construed in accordance with 35 U.S.C. § 112, ¶ 6.

172. I understand that CCE and the Defendants both agree that the claimed function for this means-plus-function element is recited in Claim 11 as "receiving a neighbor cell information message."

173. As discussed above, I understand that the corresponding structure for a means-plus-function element for a computer-implemented function includes the algorithm disclosed in the specification, if any.

174. I understand that CCE alleges that the claimed structure for this means-plus-function element is "an antenna, a receiver, and a microprocessor (1:34–47; 2:4–7; 6:19–61; Fig. 7), and equivalents thereof (no special algorithm required)." It is my understanding that CCE alleges that the microprocessor is a general purpose processor that is not implementing a particular algorithm or software. It is also my understanding that CCE cites as support the following portions of the '9923 Patent: Abstract, Fig. 1 (and related text), Fig. 6 (and related text),

Fig. 7 (and related text), 1:34–47, 2:4–7, 6:19–66, 12/15/03 Response at 11–12;[2] 5/3/04 Response at 8–12; as well as the dictionary definitions for "receiver" produced at CCE002445–2456.

175. The '9923 Patent explicitly identifies the structure for "receiving a neighbor cell information message" as "means 410," which is included in Figure 7. '9923 Patent, Col. 6:43–44. Means 410 is the only component that the specification of the '9923 Patent links to and associates with the recited function of "receiving a neighbor cell information message." '9923 Patent, Col. 6:40–50. The '9923 Patent explains that means 410 is software executed by a microprocessor:

> Preferably the means 410 and 420 are realized ***using software programs*** stored in a memory element of a control block 490 of the mobile communication means 10, the programs being executed by a microprocessor of the control block 490.

'9923 Patent, Col. 6:57–61 (emphasis added). Neither the required software nor the underlying algorithm are disclosed by the '9923 Patent.

176. Accordingly, it is my opinion that a person of ordinary skill in the art would understand that an off-the-shelf general purpose microprocessor executing off-the-shelf software would not be suitable for "receiving a neighbor cell information message," but rather a special algorithm is required to perform the claimed function. Column 1:34–47 merely describes how a prior art GSM network informs a mobile device about neighboring cells in a message that contains the cell parameters for each neighboring cell, and discusses the problems associated with receiving long messages transmitted according with the existing GSM specifications. For example, "during the transmission of the message the receiver of the mobile [device] receiving the message has to receive the message, whereby the length of the message affects considerably the receiving capacity of the mobile [device]." '9923 Patent, Col. 1:43–47. The following passage explains that "[t]he length of the message also makes it impractical to increase the number of cells described in

[2] CCE refers to a "12/13/03 Response" in Doc. 245-1. It appears that CCE might be referring to the 12/15/03 Response.

a neighbor cell information message." '9923 Patent, Col. 1:47–49. Subsequent passages emphasize that "[t]hese problems are presently increasing in severity due to the present trend in the cellular telecommunication systems towards decreasing the area of cells due to increasing data rates." '9923 Patent, Col. 1:57–64. Thus, this passage and the subsequent passages do not disclose an algorithm, or any portion of one, to carry out the claimed function of "receiving a neighbor cell information message."

177. The Abstract of the '9923 Patent merely describes that "the neighbor cell information list is transmitted in such a way, that a table reciting parameter values in use by the neighboring cells, and for each of these cells, each value listed in the table is represented by a pointer such as an index to the table" and that the "neighbor cell information list can be further compressed by expressing a first frequency parameter value in the normal way, but expressing further frequency parameter values relative to the first, or as in a further embodiment, relative to the previous frequency parameter value." '9923 Patent, Abstract. Thus, this passage does not disclose an algorithm, or any portion of one, to carry out the claimed function of "receiving a neighbor cell information message."

178. Figure 1 of the '9923 Patent merely discloses the structure of a prior art GSM network. For the reasons indicated above, the related text at Column 1:34–47 does not disclose an algorithm, or any portion of one, to carry out the claimed function of "receiving a neighbor cell information message." The related text at Column 1:26–33 merely identifies the elements depicted in Figure 1. The related text at Column 1:47–64 merely describes the problems associated with the prior art neighbor cell information message. The related text at Column 1:65–67 merely refers to the prior art GSM 04.08 specification for details about the transmitted parameters and structure of a neighbor cell information message. The related text at Column 2:54–55 describes what Figure 1

relates to. Thus, Fig. 1 (and related text) do not disclose an algorithm, or any portion of one, to carry out the claimed function of "receiving a neighbor cell information message."

179. Column 2:4–7 merely states an object of the alleged invention "to realize a method of communicating neighbor cell information reserving the receiver of a mobile [device] for a shorter time than in the prior art." This passage does not disclose an algorithm, or any portion of one, to carry out the claimed function of "receiving a neighbor cell information message."

180. Figure 7 purports to disclose a block diagram of a mobile device or generally a "mobile communication means" and Column 6:19–61 purports to describe the components depicted in Fig. 7. None of the components depicted in Figure 7, or described in the cited passage, discloses an algorithm, or any portion of one, to carry out the claimed function of "receiving a neighbor cell information message."

181. Column 6:19–27 and the corresponding blocks 452, 454, 456, 458, and 460 describe the reception of a signal, converting the received signal to baseband, and demodulating and decoding the received ***signal***. This is different than the ***cell information message*** because the message must still be extracted from the signal. A "general purpose" computer/processor would be insufficient to do the processing. It is this extraction and processing of the signal to yield the message which the patent claims is done in block 410, but the patent does not disclose any instructions or algorithms for carrying out that processing. Thus, this portion of the cited passage does not disclose an algorithm, or any portion of one, to carry out the claimed function of "receiving a neighbor cell information message."

182. Column 6:27–32 merely describes the transmitter part of the "mobile communications means." This portion of the cited passage does not link or associate the transmitter part, or any component of the transmitter part (*e.g.*, microphone 472, transmitter block

474, modulator 476, first transmitter filter 478, a transmitter amplifier 480, and a second transmitter filter 482), with the function of "receiving a neighbor cell information message." Moreover, this portion of the cited passage does not disclose an algorithm, or any portion of one, to carry out the claimed function of "receiving a neighbor cell information message."

183. Column 6:32–39 discloses additional components of the "mobile communications means." The disclosed components consist of antenna 498, oscillator block 496, control block 490, display 492 and keypad 494). In particular, "[t]he control block 490 controls the functioning of the receiver and transmitter blocks and the oscillator block, as well as displays information to the user via the display 492 and receives commands from the user via the keypad 494." '9923 Patent, Col. 6:35–39. This portion of the cited passage does not link or associate any of the antenna 498, the oscillator block 496, the display 492 and the keypad 494, with the function of "receiving a neighbor cell information message." Moreover, this portion of the cited passage does not disclose an algorithm, or any portion of one, to carry out the claimed function of "receiving a neighbor cell information message."

184. Column 6:40–56 discloses that the "mobile communication means" is also comprised of means 410 and means 420. Column 6:57–61 merely provides a generic description of the means 410 and 420. Specifically, "[p]referably the means 410 and 420 are realized using software programs stored in a memory element of a control block 490 of the mobile communication means 10, the programs being executed by a microprocessor of the control block 490." '9923 Patent, Col. 6:57–61. While the specification of the '9923 Patent alludes to software programs, it does not disclose any portion of the software programs in any manner that would distinguish the means 410 from a general purpose computer. This portion of the cited passage

does not disclose an algorithm, or any portion of one, to carry out the claimed function of "receiving a neighbor cell information message."

185. Means 420 is described as a "means 420 for associating a value of said set of parameter values indicated by one of said second values with the corresponding parameter of a neighbor." '9923 Patent, Col. 6:51–54. Accordingly, means 420 does not carry out the claimed function of "receiving a neighbor cell information message," and the patent's description of means 420 does not disclose an algorithm, or any portion of one, to carry out the claimed function of "receiving a neighbor cell information message."

186. Means 410 is the only component that the specification of the '9923 Patent links to and associates with the recited function of "receiving a neighbor cell information message." Indeed, the specification of the '9923 Patent discloses that "[a]ccording to the invention, a mobile communication means 10 further comprises at least a) means 410 for receiving a neighbor cell information message comprising a set of parameter values, and for each cell of a plurality of neighbor cells, cell information comprising at least one parameter value for a first parameter, and for at least one second parameter, one second value indicating which value of said set of parameter values is used for said second parameter." '9923 Patent, Col. 6:40–50. This portion of the cited passage, however, does not disclose an algorithm, or any portion of one, to carry out the claimed function of "receiving a neighbor cell information message." Moreover, as discussed above, while the specification discloses means 410 is preferably "realized using software programs stored in a memory element of a control block 490 of the mobile communication means 10, the programs being executed by a microprocessor of the control block 490," '9923 Patent, Col. 6:57–61, the specification does not disclose any software program or algorithm for implementing means 410.

187. Thus, the only physical structure linked to the claimed function of "receiving a neighbor cell information message" is means 410. The specification states that the microprocessor executes software programs—not that it receives a ***neighbor cell information message***. Thus, the associated structure is merely the unidentified software being executed on a generic microprocessor. No accompanying algorithm is disclosed, either in these passages or elsewhere in the specification.

188. The 12/15/03 Response at 11–12 merely argues that the alleged invention is patentable over the cited prior art and that it reduces the size of neighbor cell information. The 12/15/03 Response at 11–12 does not disclose an algorithm, or any portion of one, to carry out the claimed function of "receiving a neighbor cell information message."

189. The 05/03/04 Response at 8–12 does not disclose an algorithm, or any portion of one, to carry out the claimed function of "receiving a neighbor cell information message." For example, the 05/03/04 Response at 8 merely argues that the alleged invention reduces the size of neighbor cell information. The 05/03/04 Response at 8–10 discusses, in the context of independent claim 1, an example of how a neighbor cell information message is generated for transmission to a mobile device by referring to Figures 2–5 of the application. The 05/03/04 Response at 11 went on to state that "the independent claims of the present application recite, in one form or another, methods, a device, and systems in which neighbor cell information messages are reduced in size by specifying a common value for a particular parameter rather than repeating the entire actual value of the common parameter values." 05/03/04 Response at 11. The subsequent paragraphs of the 05/03/04 Response at 11–12 merely attempt to distinguish the step of "generating a neighbor cell information message" as recited in Claim 1 from the cited prior art

references. Thus, the 05/03/04 Response at 8–12 does not disclose an algorithm, or any portion of one, to carry out the claimed function of "receiving a neighbor cell information message."

190. In light of the foregoing, it is my opinion that the '9923 Patent's specification does not disclose to a person of ordinary skill in the art a special algorithm for performing the claimed function of "receiving a neighbor cell information message." Thus, Claim 11 is indefinite.

V. Compensation

191. I am being compensated for the time I spend on this case at my normal consulting rate of $600 per hour. My compensation is not based on either the content of my opinions or the outcome of this case.

I declare under penalty of perjury under the laws of the United States that the foregoing is true and correct.

Executed this 14th day of November 2014, at Denton, Texas.

Robert Akl, D.Sc.

Attachment 1

Robert Akl, D.Sc.

Professional Summary

Dr. Akl has over 20 years of industry and academic experience. He is currently a Tenured Associate Professor at the University of North Texas and a Senior Member of IEEE. He has designed, implemented, and optimized both hardware and software aspects of several wireless communication systems for CDMA, Wi-Fi, and sensor networks. He has broad expertise in wireless communication, Bluetooth, CDMA/WCDMA network optimization, GSM, LTE, VoIP, computer architecture, and computer networks. He is a very active researcher and is well published and cited. He has given depositions, trial testimony, and has prepared expert reports on claim construction, claim invalidity, infringement, and non-infringement. He has handled both ITC and district court cases. Dr. Akl was the 2008 recipient of the IEEE Professionalism Award and winner of the 2010 Tech Titan of the Future Award.

Areas of Expertise

Wireless Communication, 2G, 3G, 4G, CDMA/WCDMA, GSM, UMTS, LTE, Wireless Sensors, Bluetooth, VoIP, Multi-cell Network Optimization, Call Admission Control, Channel Coding, Ad-hoc Networks, Computer Architecture.

Employment History

From: 5/2008 **University of North Texas**
To: Present Denton, TX
Position: *Associate Professor Department of Computer Science and Engineering*
Conducting research on cellular networks and wireless sensor networks. Teaching wireless communication courses. Advising graduate and undergraduate students.

From: 9/2002 **University of North Texas**
To: 5/2008 Denton, TX
Position: *Assistant Professor Department of Computer Science and Engineering*
Conducting research on WCDMA/UMTS wireless networks. Teaching wireless communication and computer architecture courses. Advising graduate and undergraduate students.

From: 1/2002 **University of New Orleans**
To: 8/2002 New Orleans, LA
Position: *Assistant Professor Department of Electrical Engineering*
Designed and taught two new courses “Computer Systems Design I and II”. Developed a Computer Engineering Curriculum with strong hardware-design emphasis. Formed a wireless research group. Advised graduate and undergraduate students.

From: 10/2000 **Comspace Corporation**
To: 12/2001 Coppell, TX
Position: *Senior Systems Engineer*
Designed, coded (in Matlab), and simulated Viterbi decoding, Turbo coding, trellis coded modulation (TCM), and Reed-Muller codes. Optimized soft decision parameters and interleavers for additive white Gaussian and Rayleigh faded channels. Extended the control and trunking of push-to-talk Logic Trunked Radio (LTR) to include one-to-one and one-to-many voice and data messaging.

From: 8/1996 **MinMax Corporation**
To: 8/2000 Saint Louis, MO
Position: *Research Associate*
Designed software packages that provide the tools to flexibly allocate capacity in a CDMA network and maximize the number of subscribers. Validated, simulated (logical and timing), and developed the hardware architecture for an ATM switch capable of channel group switching.

From: 8/1994 **Washington University**
To: 8/2000 Saint Louis, MO
Position: *Research and Teaching Assistant*
Taught, consulted, and graded Circuit Analysis at the undergraduate level and Network Design at the graduate level.

Litigation Support and Expert Witness Experience

L1. 2014 **Paul Hastings LLP**
Case: Cellular Communications Equipment LLC v. AT&T, et al.
Eastern district of Texas, Tyler division, Case No. 6:13-cv-507-LED (Lead Case for Consolidation)
Matter Project: Patent infringement, 3G cellular communication
Claim construction, declaration

L2. 2014 **EIP US LLP**
Case: Good Technology Software, Inc. v. AirWatch LLC
IPR2015-00248
Matter Project: *Inter Partes* Review, software management in wireless devices
Declaration to support IPR petition

L3. 2014 **Bragalone Conroy PC**
Case: Securus Technologies, Inc. v. Global Tel*Link Corporation
IPR2015-00153, IPR2015-00155, IPR2015-00156
Matter Project: *Inter Partes* Review, VoIP call monitoring and recording
Three declarations to support 3 IPR petitions

L4.	2014	**Andrews Kurth LLP**
	Case:	Sony Mobile Communications (USA) v. Adaptix Inc. IPR2014-01524, IPR2014-01525
	Matter	*Inter Partes* Review, subcarrier selection in LTE
	Project:	Two declarations to support 2 IPR petitions
L5.	2014	**Steptoe & Johnson LLP, Baker & McKenzie LLP**
	Case:	VTech Communications, Inc. and Uniden America Corporations v. Spherix Incorporated IPR2014-01432
	Matter	*Inter Partes* Review, IP telephony
	Project:	Declaration to support IPR petition
L6.	2014	**Steptoe & Johnson LLP, Baker & McKenzie LLP**
	Case:	Spherix Inc. v. VTech Telecommunications Ltd., et al. Spherix Inc. v. Uniden Corp, et al. Northern District of Texas, Dallas Division, Case No. 3:13-cv-3494 and 3:13-cv-3496
	Matter	Patent infringement, IP telephony
	Project:	Claim construction, declaration, deposition
L7.	2014	**McKool Smith**
	Case:	Good Technology Corp. v. MobileIron, Inc. Good Technology Corp. v. AirWatch LLC Northern District of California, Case No. 5:12-cv-05826-PSG and 5:12-cv-05827-EJD
	Matter	Patent infringement, software management in wireless devices
	Project:	Claim construction, 2 declarations
L8.	2014	**Lee & Hayes**
	Case:	Broadcom Corp. v. Ericsson, Inc. IPR2013-00601, IPR2013-00602, and IPR2013-00636
	Matter	*Inter Partes* Review, ARQ protocols
	Project:	Three declarations to support Patent Owner's Response, two declarations to support Patent Owner's Motion to Amend, deposition, two reply declarations
L9.	2014	**Sidley Austin LLP**
	Case:	Adaptix, Inc. v. Huawei Technologies Co., et al. Eastern District of Texas, Case No. 6:13-cv-00438, 439, 440 and 441
	Matter	Patent infringement, subcarrier selection in LTE
	Project:	Non-infringement consulting, source code review
L10.	2014	**Finnegan Henderson Farabow Garrett & Dunner LLP**
	Case:	Cell and Network Selection LLC v. Huawei Technologies Co., et al. Eastern District of Texas, Case No. 6:13-cv-00404-LED-JDL

	Matter	Patent infringement, base station selection in LTE
	Project:	Non-infringement consulting

L11.	2014	**Lott & Fischer**
	Case:	Zenith Electronics, LLC, et al. v. Craig Electronics, Inc. Southern District of Florida, Case No. 9:13-cv-80567-DMM/DLB
	Matter	Patent infringement, HDTV transmission and reception
	Project:	Opening expert report regarding nonessentiality

L12.	2013	**McKool Smith**
	Case:	Zenith Electronics, LLC, et al. v. Curtis International Ltd. Southern District of Florida, Case No. 9:13-cv-80568-DMM/DLB
	Matter	Patent infringement, HDTV transmission and reception
	Project:	Claim construction, declaration

L13.	2013	**Gibson Dunn**
	Case:	Straight Path IP Group v. Sharp Corp. and Sharp Electronics Corp. In the Matter of Certain Point-to-Point Network Communication Devices and Products Containing Same, ITC Investigation No. 337-TA-892
	Matter	Patent infringement, point-to-point network communication
	Project:	Non-infringement consulting

L14.	2013	**Kilpatrick Townsend & Stockton LLP**
	Case:	Monec Holding AG v. Motorola Mobility LLC, et al. District of Delaware, Case No. 1:11-cv-798-LPS-SRF
	Matter	Patent infringement, displaying books on tablets
	Project:	Non-infringement expert report for Motorola, non-infringement expert report for HTC, deposition

L15.	2013	**Gartman Law Group**
	Case:	Lone Star WiFi LLC v. Legacy Stonebriar Hotel, Ltd; et al. Eastern Dist. Of Texas, Tyler, Case No. 6:12-cv-957
	Matter	Patent infringement, levels of access in Wi-Fi networks
	Project:	Claim validity consulting

L16.	2013	**White & Case, LLP**
	Case:	Nokia Corp and Nokia, Inc. v. HTC Corp and HTC America, Inc. In the Matter of Certain Portable Electronic Communication Devices, Including Mobile Phones and Components Thereof, ITC Investigation No. 337-TA-885
	Matter	Patent infringement, App download and installation
	Project:	Non-infringement consulting

L17. 2013 **Heim, Payne & Chorush, LLP**
Case: Rembrandt Wireless v. Samsung; and RIM/Blackberry
Eastern Dist. of Texas, Marshal, Case No. 2:13-cv-213-JRG-RSP
Matter Patent infringement, Bluetooth
Project: Expert report regarding validity, deposition

L18. 2013 **Davis Polk & Wardwell LLP**
Case: Comcast v. Sprint; and Nextel Inc.
Eastern Dist. of Pennsylvania, Case No. 2:12-cv-00859-JD
Matter Patent infringement, SMS in Cellular Networks
Project: Infringement consulting

L19. 2013 **McKool Smith**
Case: Samsung Electronics America v. Ericsson Inc.
In the Matter of Certain Wireless Communications Equipment and Articles Therein, ITC Investigation No. 337-TA-866
Matter Patent infringement, LTE uplink and downlink
Project: Prior art research, source code review, claim construction, claim invalidity expert report, non-infringement expert report, hearing testimony

L20. 2012 **DLA Piper US LLP**
Case: CSR Technology Inc. v. Freescale Semiconductor, Inc.
USDC-San Francisco, Case No. 3:12-cv-02619-RS
Matter Patent infringement, radio transceivers
Project: Claim construction, declaration

L21. 2012 **Fish & Richardson PC**
Case: GPNE Corp. v. Apple, Inc.; et al.
USDC-ND California, Case No. 5:12-cv-02885-LHK
Matter Patent infringement, resource allocation in wireless networks
Project: Prior art research consulting

L22. 2012 **Polsinelli Shughart PC**
Case: Single Touch Interactive, Inc. v. Zoove Corporation
Northern Dist. of California, Case No. 3:12-cv-00831-JSC
Matter Patent infringement, abbreviated dialing, information delivery
Project: Claim construction, Markman hearing tutorial, declaration

L23. 2012 **K & L Gates**
Case: EON Corp. IP Holdings, LLC v. Novatel Wireless, Inc.; et al.
DC-Tyler, Texas, Case No. 6:11-cv-00015-LED-JDL
Matter Patent infringement, wireless modem and 3G services
Project: Non-infringement expert report, deposition

L24. 2012 **Simpson Thacher & Bartlett LLP**
Case: CSR Technology, Inc. v. Bandspeed, Inc.
Western Dist. of Texas, Case No. 1:12-cv-297-LY
Matter Patent infringement, packet identification in 2.4 GHz and 5 GHz
Project: Source code review, Markman hearing tutorial, infringement expert report

L25. 2012 **Sheppard Mullin Richter & Hampton LLP**
Case: Wi-LAN v. HTC America, Inc.
Eastern Dist. of Texas, Case No. 6:10-cv-521-LED
Matter Patent infringement, CDMA, Orthogonal Codes
Project: Source code review, non-infringement expert report, deposition, trial testimony

L26. 2012 **Dechert LLP**
Case: Hitachi v. TPV and Vizio, Inc.; and Vizio v. Hitachi, LTD.
Eastern Dist. of Texas, Case No. 2:10-cv-260
Matter Patent infringement, HD television transmission and reception
Project: Prior art research, claim invalidity consulting

L27. 2012 **Fish & Richardson PC**
Case: InterDigital Commc'n, LLC v. Huawei Tech. Co. LTD; LG Electronics, Inc.; Nokia, Inc.; and ZTE (USA) Inc.
Certain Wireless Devices With 3G Capabilities and Components Thereof, ITC Investigation No. 337-TA-800
Matter Patent infringement, channel coding in UMTS, HSDPA
Project: Non-infringement consulting

L28. 2012 **Fish & Richardson PC**
Case: InterDigital Commc'n, LLC v. Huawei Tech. Co. LTD; LG Electronics, Inc.; Nokia, Inc.; and ZTE (USA) Inc.
Dist. of Delaware, Case No. 1:11-cv-00654-UNA
Matter Patent infringement, channel coding in UMTS, HSDPA
Project: Non-infringement consulting

L29. 2011 **O'Melveny & Myers LLP**
Case: MobileMedia Ideas, LLC v. Apple, Inc.
Dist. of Delaware, Case No. 1:10-cv-00258-SLR-MPT
Matter Patent infringement, voice control, call rejection in mobile phones
Project: Source code review, prior art research, declaration, claim invalidity expert report, non-infringement expert report, deposition, trial testimony

L30. 2011 **Wilmer Cutler Pickering Hale and Dorr**
Case: Apple, Inc. v. Samsung Electronics Co.
Northern Dist. of California, Case No. 5:11-cv-01846-LHK
Matter Patent infringement, channel coding in CDMA, E-AGCH, TFCI

Project: Prior art research, claim construction consulting

L31. 2011 **Weil, Gotshal & Manges LLP**
Case: Vizio, Inc. v. Renesas Electronics America, Inc.
ITC Investigation No. 337-TA-789
Matter Patent infringement, HD television transmission and reception
Project: Claim invalidity consulting

L32. 2011 **Shapiro Cohen**
Case: TenXc Wireless Inc. v. Andrew LLC
TenXc Wireless Inc. v. Mobi Antenna Technologies Ltd.
Matter Patent infringement, antenna design, sectorized cellular network
Project: Claim validity consulting

L33. 2010 **Fish & Richardson PC**
Case: Vizio, Inc., v. LG Electronics, Inc.
ITC Investigation No. 337-TA-733
Matter Patent infringement, HD television transmission and reception
Project: Claim charts, claim construction expert report, deposition

L34. 2010 **Fish & Richardson PC**
Case: Vizio, Inc., v. LG Electronics, Inc.
Dist. of Maryland, Case No. 1:09-cv-1481-BEL
Matter Patent infringement, HD television transmission and reception
Project: Claim charts, claim construction expert report, deposition

L35. 2008 **Kaye Scholer LLP**
Case: eBay Inc. v. IDT.
Western Dist. of Arkansas, Case No. 4:08-cv-4015-HFB
Matter Patent infringement, long distance communication using Internet
Project: Prior art research, claim construction consulting

L36. 2008 **Simpson Thacher & Bartlett LLP**
Case: Commil USA, LLC v. Cisco Systems, Inc.
Eastern Dist. of Texas, Case No. 2:07-cv-00341-DF-CE
Matter Patent infringement, two-level wireless protocol
Project: Prior art research

L37. 2006 **Woodfill and Pressler**
Case: Charles Russell v. Interinsurance Exchange of the Auto Club
Harris County, Texas, Case No. 2005-19706
Matter House fire and insurance claim
Project: Determining user location using cellular phone records, expert report, deposition, trial testimony

Consulting History

From: 1/2013 **Heim, Payne & Chorush, LLP**
To: 3/2013 Houston, TX
Duties: Analyze patents on wireless technologies.

From: 4/2007 **Collin County Sheriff's Office**
To: 5/2007 McKinney, TX
Duties: Analyzed cellular record data and determined user location in a double-homicide investigation.

From: 4/2004 **Allegiant Integrated Solutions**
To: 5/2004 Fort Worth, TX
Duties: Designed and developed an integrated set of tools for fast deployment of wireless networks. The tools optimize the placement of Access Points and determine their respective channel allocations to minimize interference and maximize capacity.

From: 3/2002 **Input/Output Incorporated**
To: 4/2002 New Orleans, LA
Duties: Designed and implemented an algorithm in MATLAB for optimizing the frequency selection process used by sonar for scanning the bottom of the ocean.

From: 6/1998 **Teleware Corporation**
To: 7/1998 Seoul, South Korea
Duties: Designed and developed a software package for analyzing the capacity in a CDMA network to maximize the number of subscribers.

Education

Year	College/University	Degree	GPA
2000	Washington University in Saint Louis	D.Sc. in Electrical Engineering	**4.0 / 4.0**
1996	Washington University in Saint Louis	M.S. in Electrical Engineering	**4.0 / 4.0**
1994	Washington University in Saint Louis	B.S. in Electrical Engineering	**4.0 / 4.0**
1994	Washington University in Saint Louis	B.S. in Computer Science	**4.0 / 4.0**

Graduated *summa cum laude* and ranked first in undergraduate class.
Dissertation: "Cell Design to Maximize Capacity in Cellular Code Division Multiple Access (CDMA) Networks." Advisors: Dr. Manju Hegde and Dr. Paul Min.

Funded Proposals

R1. "Robotics, Game and App Programming Summer Camps" under Texas Workforce Commission: Summer Merit Program. Requested amount is $63,000. Submitted 12/14/12. Robert Akl (PI), **awarded $63,000**.

R2. "Bio-Com Project," funded by Raytheon under Net-Centric Software and Systems I/UCRC 2nd year. Requested amount is $30,000. Submitted 5/12/12. Krishna Kavi (PI), Robert Akl (co-PI), **awarded $30,000.**

R3. "Bio-Com Project," funded by Raytheon under Net-Centric Software and Systems I/UCRC. Requested amount is $30,000. Submitted 5/12/11. Krishna Kavi (PI), Robert Akl (co-PI), **awarded $30,000.**

R4. "Game Programming for Xbox 360 Summer Camp" under Texas Higher Education Coordinating Board: Engineering Summer Program. Requested amount is $20,000. Submitted 3/21/11. Robert Akl (PI), **awarded $20,000**.

R5. "RoboCamps and Game Programming Summer Camps" under Texas Workforce Commission: Summer Merit Program. Requested amount is $63,000. Submitted 2/17/11. Robert Akl (PI), **awarded $63,000**.

R6. "Game Programming for Xbox 360 Summer Camp" under Texas Higher Education Coordinating Board: Engineering Summer Program. Requested amount is $13,000. Submitted 2/22/10. Robert Akl (PI), **awarded $18,000.**

R7. "Robotics and Game Programming Summer Camps" under Texas Workforce Commission: Summer Merit Program. Requested amount is $63,000. Submitted 10/16/09. Robert Akl (PI), **awarded $63,000**.

R8. "Micro Air Vehicle Design: A Collaborative Undergraduate Project for Electrical Engineering, Computer Engineering, and Computer Science Students," under UNT Undergraduate Research Initiative. Submitted 9/25/2009. Robert Akl (co-PI), **awarded $8,000**.

R9. "Summer Merit Program" under Texas Workforce Commission. Requested amount is $42,000. Submitted 3/20/09. Robert Akl (PI), **awarded $42,000**.

R10. "Robocamp at Stewpot" under Dallas Women's Foundation. Requested amount is $20,000. Submitted 2/23/09. Robert Akl (PI), **awarded $18,600**.

R11. "Robocamp Jump Start" under Motorola Foundation Innovation Generation Grant. Requested amount is $29,852. Submitted 2/12/09. Robert Akl (PI), **awarded $30,700**.

R12. "Engineering Summer Program" under Texas Higher Education Coordinating Board. Requested amount is $7,944. Submitted 2/13/09. Robert Akl (PI), **awarded $11,111**.

R13. "Texas Youth in Technology" under Texas Workforce Commission. Requested amount is $152,393. Submitted 11/10/08. Robert Akl (PI), **awarded $152,393**.

R14. "IUCRC Center Proposal: Net-Centric Software and Systems," under NSF-07-537: Industry/University Cooperative Research Centers. Requested amount is $349,482. Submitted 9/26/08. Krishna Kavi (PI), Robert Akl (co-PI), **awarded $60,000 per year for 5 years**.

R15. "Robocamp and Beyond" under Motorola Foundation Innovation Generation Grant. Requested amount is $30,000. Submitted 6/20/08. Robert Akl (PI), **awarded $30,000**.

R16. Texas Youth in Technology" under Texas Workforce Commission. Requested amount is $30,000. Submitted 2/27/08. Robert Akl (PI), **awarded $31,500**.

R17. "Robocamp Program for Young Women" under RGK foundation. Requested amount is $30,000. Submitted 11/5/07. Robert Akl (PI), **awarded $15,000**.

R18. "Texas Youth in Technology" under Texas Workforce Commission. Requested amount is $102,514. Submitted 10/22/07. Robert Akl (PI), **awarded $102,514**.

R19. "Women Art Technology" under Hispanic and Global Studies Initiatives Fund. Requested amount is $14,125. Submitted 9/30/07. Jennifer Way (PI), Robert Akl (co-PI), **awarded $12,785**.

R20. "Robocamp Mobile Unit" under Motorola Foundation Innovation Generation Grant. Requested amount is $35,000. Submitted 6/20/07. Robert Akl (PI), **awarded $30,000**.

R21. "ICER: UNT Engineering Challenge Camps" under NSF 0547299. Requested amount is $35,000. Submitted 4/27/07. Oscar Garcia (PI), Robert Akl (senior personnel), **awarded $32,792**.

R22. "IUCRC-Planning Proposal: UNT Research Site Proposal to join Embedded Systems I/UCRC," under NSF-01-116: Industry/University Cooperative Research Centers. Requested amount is $10,000. Submitted 3/31/07. Krishna Kavi (PI), Robert Akl (co-PI), **awarded $10,000**.

R23. "High-assurance NCCS: Ultra Dependability Integration Engineering," Department of Defense. Requested amount is $20,000. Submitted 3/12/07. Krishna Kavi (PI), Robert Akl (co-PI), **awarded $20,000**.

R24. "Recruiting and Retention Strategies for Computer Science at UNT" under Texas Technology Workforce Development Grant Program – 2005. Requested amount is $163,322. Submitted 3/17/05. Robert Akl (PI), **awarded $125,322**.

R25. UNT Faculty Research Grant for Fall 2003, Robert Akl (PI), $5,000, **awarded $4,000**.

R26. UNT Junior Faculty Summer Research Fellowship for Summer 2003, Robert Akl (PI), $5,000, **awarded $5,000**.

Publications

Journal Publications

J1. M. Haidar, H.M. Al-Rizzo, **R. Akl**, and Z. Elbazzal, "The Effect of an Enhanced Channel Assignment Algorithm in an IEEE 802.11 WLAN," *World Scientific and Engineering Academy and Society Transactions on Communications*, WSEAS, Vol. 8, Issue 12, December 2009.

J2. **R. Akl**, P. Kadiyala, and M. Haidar, "Non-Uniform Grid-Based Coordinated Routing in Wireless Sensor Networks", *Journal of Sensors*, article ID 491349, volume 2009, 11 pages.

J3. M. Haidar, M. Al-Rizzo, Y. Chan, **R. Akl**, "User-Based Channel Assignment Algorithm in a Load-Balanced IEEE 802.11 WLAN", *International Journal of Interdisciplinary Telecommunications & Networking (IJITN)*, April-June 2009, 1(2), pp. 66-81.

J4. **R. Akl**, D. Keathly, and R. Garlick, "Strategies for Retention and Recruitment of Women and Minorities in Computer Science and Engineering," *iNEER Special Volume: Innovations 2007- World Innovations in Engineering Education and Research*, 9 pgs., 2007.

J5. R. Garlick and **R. Akl**, "Motivating and Retaining CS2 Students with a Competitive Game Programming Project," *iNEER Special Volume: Innovations 2007- World Innovations in Engineering Education and Research*, 9 pgs., 2007.

J6. **R. Akl** and S. Nguyen, "UMTS Capacity and Throughput Maximization for Different Spreading Factors," *Journal of Networks*, July 2006, vol. 1, issue 3, pp. 40-49. ISSN: 1796-2056

J7. W. Li, K. Kavi, and **R. Akl**, "A Non-preemptive Scheduling Algorithm for Soft Real-time Systems," *Journal of Computer and Electrical Engineering*, 2006, vol. 32, 18 pgs. ISSN: 0045-7906

J8. **R. Akl**, A. Parvez, and S. Nguyen, "Effects of Interference on Capacity in Multi-Cell CDMA Networks," *Journal of Systemics, Cybernetics and Informatics*, 2006, vol. 3, no. 1, p825612, 7 pgs. ISSN: 1690-4524

J9. **R.G. Akl**, M. Hegde and M. Naraghi-Pour, "Mobility-based CAC Algorithm for Arbitrary Traffic Distribution in CDMA Cellular Systems," *IEEE Transactions on Vehicular Technology*, March 2005, vol. 54, no. 2, pp. 639-651.

J10. **R.G. Akl**, M.V. Hegde, M. Naraghi-Pour, P.S. Min, "Multi-Cell CDMA Network Design," *IEEE Transactions on Vehicular Technology*, May 2001, vol. 50, no. 3, pp. 711-722.

Conference Proceedings

C1. R. Tidwell, S. Akumalla, S. Karlaputi, **R. Akl**, K. Kavi, and D. Struble, "Evaluating the Feasibility of EMG and Bend Sensors for Classifying Hand Gestures," *1st International Conference on Multimedia and Human Computer Interaction*, July 2013, paper no. 63, 8 pgs.

C2. **R. Akl**, K. Pasupathy, and M. Haidar, "Anchor Nodes Placement for Effective Passive Localization," *2011 IEEE International Conference on Selected Topics in Mobile and Wireless Networks (iCOST)*, October 2011, paper no. 1569490799, pp. 127 - 132.

C3. **R. Akl**, P. Kadiyala, and M. Haidar, "Non-Uniform Grid-Based Routing in Sensor Networks", *9th IEEE Malaysia International Conference on Communications*, December 2009, paper no. 1569243649, pp. 536 - 540.

C4. M. Haidar, M. Al-Rizzo, Y. Chan, **R. Akl**, M. Bouharras, "Throughput Validation of an Advanced Channel Assignment Algorithm in IEEE 802.11 WLAN", *ICCSN 2009 – International Conference on Communication Software and Networks*, February 2009, paper no. P385, pp. 801 - 806.

C5. **R. Akl** and D. Keathly, "Robocamp: Encouraging Young Women to Embrace STEM," 4th Annual TETC Best Practices Conference, February 2009, 13 pgs.

C6. M. Haidar, R. Ghimire, M. Al-Rizzo, **R. Akl**, Y. Chan, "Channel Assignment in an IEEE 802.11 WLAN Based on Signal-to-interference Ratio", *IEEE CCECE – Canadian Conference on Electrical and Computer Engineering: Communications and Networking*, May 2008, paper no. 1569092894, pp. 1169 - 1174.

C7. H. Al-Rizzo, M. Haidar, **R. Akl**, and Y. Chan, "Enhanced Channel Assignment and Load Distribution in IEEE 802.11 WLANs," *IEEE International Conference on Signal Processing and Communication*, November 2007, paper no. 1569042132, pp. 768 - 771.

C8. **R. Akl** and Y. Saravanos, "Hybrid Energy-Aware Synchronization Algorithm in Wireless Sensor Networks," *18th Annual IEEE International Symposium on Personal, Indoor and Mobile Radio Communications*, September 2007, paper no 692, 5 pgs.

C9. M. Haidar, **R. Akl**, and H. Al-Rizzo, "Channel Assignment and Load Distribution in a Power-Managed WLAN," *18th Annual IEEE International Symposium on Personal, Indoor and Mobile Radio Communications*, September 2007, paper no. 463, 5 pgs.

C10. D. Keathly and **R. Akl,** "Attracting and Retaining Women in Computer Science and Engineering: Evaluating the Results," *Proceedings of American Society for Engineering Education: ASEE Annual Conference*, June 2007, paper no. AC 2007-1229, 10 pgs.

C11. M. Haidar, **R. Akl**, H. Al-Rizzo, Y. Chan, R. Adada, "Optimal Load Distribution in Large Scale WLAN Networks Utilizing a Power Management Algorithm," *Proceedings of IEEE Sarnoff Symposium*, May 2007, 5 pgs.

C12. R. Dantu, P. Kolan, **R. Akl,** and K. Loper, "Classification of Attributes and Behavior in Risk Management Using Bayesian Networks," *Proceedings of IEEE Intelligence and Security Informatics Conference*, May 2007, pp. 71-74.

C13. **R. Akl** and A. Arepally, "Dynamic Channel Assignment in IEEE 802.11 Networks," *Proceedings of IEEE Portable 2007: International Conference on Portable Information Devices*, March 2007, pp 309-313.

C14. **R. Akl** and U. Sawant, "Grid-based Coordinated Routing in Wireless Sensor Networks," *Proceedings of IEEE CCNC 2007: Consumer Communications and Networking Conference*, January 2007, pp. 860-864.

C15. **R. Akl** and A. Arepally, "Simulation of Throughput in UMTS Networks with Different Spreading Factors," *Proceedings of IEEE VTC Fall 2006: Vehicular Technology Conference*, September 2006, pp. C1-5.

C16. A. Alhabsi, H. Al-Rizzo, and **R. Akl,** "Parity Assisted Decision Making for QAM Modulation," *International Conference on Mobile Computing and Wireless Communications*, September 2006, paper no. 1568988776, 5 pgs.

C17. **R. Akl** and R. Garlick**,** "Retention and Recruitment of Women in Computer Engineering," *ICEE 2006: International Conference on Engineering Education*, July 2006, paper no. 3318, 5 pgs.

C18. R. Garlick and **R. Akl,** "Intra-Class Competitive Assignments in CS2: A One-Year Study," *ICEE 2006: International Conference on Engineering Education*, July 2006, paper no. 3325, 5 pgs.

C19. **R. Akl**, D. Tummala, and X. Li, "Indoor Propagation Modeling at 2.4 GHz for IEEE 802.11 Networks," *WNET 2006: Wireless Networks and Emerging Technologies*, July 2006, paper no. 510-014, 6 pgs.

C20. P. Chen, K. Kavi, and **R. Akl,** "Performance Enhancement by Eliminating Redundant Function Execution," *Proceedings of IEEE: 39th Annual Simulation Symposium*, April 2006, pp. 143-150.

C21. **R. Akl** and S. Nguyen, "Capacity Allocation in Multi-cell UMTS Networks for Different Spreading Factors with Perfect and Imperfect Power Control," *Proceedings of IEEE CCNC 2006: Consumer Communications and Networking Conference*, January 2006, vol. 2, pp. 928-932.

C22. W. Li, K. Kavi, and **R. Akl**, "An Efficient Non-Preemptive Real-Time Scheduling," *18th International Conference on Parallel and Distributed Computing Systems*, Las Vegas, NV, September 2005, pp. 154-160.

C23. S. Nguyen and **R. Akl**, "Approximating User Distributions in WCDMA Networks Using 2-D Gaussian," *CCCC20T 05: International Conference on Computing, Communications, and Control Technologies*, July 2005, 5 pgs.

C24. **R. Akl** and S. Park, "Optimal Access Point Selection and Traffic Allocation in IEEE 802.11 Networks," *Proceedings of 9th World Multiconference on Systemics, Cybernetics and Informatics (WMSCI 2005): Communication and Network Systems, Technologies and Applications*, July 2005, vol. 8, pp. 75-79.

C25. **R. Akl**, M. Naraghi-Pour, M. Hegde, "Throughput Optimization in Multi-Cell CDMA Networks," *IEEE WCNC 2005 - Wireless Communications, and Networking Conference*, March 2005, vol. 3, pp. 1292-1297.

C26. **R. Akl**, "Subscriber Maximization in CDMA Cellular Networks," *Proceedings of CCCT 04: International Conference on Computing, Communications, and Control Technologies*, August 2004, vol. 3, pp. 234-239.

C27. **R. Akl** and A. Parvez, "Global versus Local Call Admission Control in CDMA Cellular Networks," *Proceedings of CITSA 04: Communications, Information and Control Systems, Technologies and Applications*, July 2004, vol. 2, pp. 283-288.

C28. **R. Akl** and A. Parvez, "Impact of Interference Model on Capacity in CDMA Cellular Networks," *Proceedings of SCI 04: Communication and Network Systems, Technologies and Applications*, July 2004, vol. 3, pp. 404-408. Selected as **best paper** of those presented in the session: Tele-Communication Systems, Technologies and Application II.

C29. **R.G. Akl**, M.V. Hegde, M. Naraghi-Pour, P.S. Min, "Call Admission Control Scheme for Arbitrary Traffic Distribution in CDMA Cellular Systems," *IEEE Wireless Communications and Networking Conference*, September 2000, vol. 1, pp. 465-470.

C30. **R.G. Akl**, M.V. Hegde, M. Naraghi-Pour, P.S. Min, "Cell Placement in a CDMA Network," *IEEE Wireless Communications and Networking Conference*, September 1999, vol. 2, pp. 903-907.

C31. **R.G. Akl**, M.V. Hegde, P.S. Min, "Effects of Call Arrival Rate and Mobility on Network Throughput in Multi-Cell CDMA," *IEEE International Conference on Communications*, June 1999, vol. 3, pp. 1763-1767.

C32. **R.G. Akl**, M.V. Hegde, M. Naraghi-Pour, P.S. Min, "Flexible Allocation of Capacity in Multi-Cell CDMA Networks," *IEEE Vehicular Technology Conference*, May 1999, vol. 2, pp. 1643-1647.

Technical Papers

T1. J. Williams, **R. Akl,** et al, "Flight Control Subsystem," *The Eagle Feather*, Special Section: Undergraduate Research Initiative in Engineering, University of North Texas, Vol. 7, 2010.

T2. **R.G. Akl**, M.V. Hegde, A. Chandra, P.S. Min, "CDMA Capacity Allocation and Planning," Technical Document, Washington University Department of Electrical Engineering WUEE-98, April 1998.

Book Chapters

B1. R. Akl, Y. Saravanos, and M. Haidar, "Chapter 18: Hybrid Approach for Energy-Aware Synchronization in Sensor Networks," *Sustainable Wireless Sensor Networks*, December 2010, pgs. 413-429, ISBN: 978-953-307-297-5.

B2. K. Kavi, **R. Akl** and A. Hurson, "Real-Time Systems: An Introduction and the State-of-the-Art," *Encyclopedia of Computer Science and Engineering*, John Wiley & Sons, Volume 4, January 2009, pgs. 2369-2377.

B3. **R. Akl** and K. Kavi, "Chapter 12: Modeling and Analysis using Computational Tools," *Introduction to Queuing Theory: Modeling and Analysis*, Birkhauser Boston, December 2008, pgs. 295-320.

Technical Presentations

P1. "Bio-Com Project," Raytheon, Richardson TX, May 2012, (invited).

P2. "Bio-Com Project," Net-Centric Software and Systems I/UCRC Meeting, Denton TX, December 2011, (invited).

P3. "Student Outreach Report: Robocamp," College of Engineering Advisory Board Meeting, Denton TX, May 2011, (invited).

P4. "Robocamp: Encouraging Young Women to Embrace STEM," 4th Annual TETC Best Practices Conference, Austin TX, February 2009, (invited).

P5. "Self-Configuring Wireless MEMS Network (demo)," Southern Methodist University, Dallas TX, January 2008, (invited).

P6. "Energy-aware Routing and Hybrid Synchronization in Sensor Networks," *Southern Methodist University*, Dallas TX, September 2007, (invited).

P7. "Retention and Recruitment of Women in Computer Engineering," *ICEE 2006: International Conference on Engineering Education*, Puerto Rico, July 2006, (refereed).

P8. "Capacity Allocation in Multi-cell UMTS Networks for Different Spreading Factors with Perfect and Imperfect Power Control," *IEEE CCNC 2006: Consumer Communications and Networking Conference*, Las Vegas, NV, January 2006, (refereed).

P9. "Research, Teaching, and Outreach," CSE Advisory Council Meeting, *UNT Research Park*, Denton, TX, December 2005, (invited).

P10. "WiFi and WCDMA Network Design," *University of Arkansas*, Little Rock, AR, April 2005, (invited).

P11. "WiFi and WCDMA Network Design," *Southern Methodist University*, Dallas, TX, March 2005, (invited).

P12. "Current Research in Wireless at UNT," *Nortel Networks*, Richardson, TX, October 2004, (invited).

P13. "Subscriber Maximization in CDMA Cellular Networks," *International Conference on Computing, Communications, and Control Technologies*, Austin, TX, August 2004, (refereed).

P14. "Global versus Local Call Admission Control in CDMA Cellular Networks," *International Conference on Cybernetics and Information Technologies, Systems and Applications*, Orlando, FL, July 2004, (refereed).

P15. "Impact of Interference Model on Capacity in CDMA Cellular Networks," *8th World Multi-Conference on Systemics, Cybernetics, and Informatics*, Orlando, FL, July 2004, (refereed).

P16. "CDMA Network Design," IEEE Communications Society – New Orleans Chapter, New Orleans, LA, May 2002, (invited).

P17. "Cell Design to Maximize Capacity in CDMA Networks," Louisiana State

University, Baton Rouge, LA, April 2002, (invited).

P18. "Call Admission Control Scheme for Arbitrary Traffic Distribution in CDMA Cellular Systems," *IEEE Wireless Communications and Networking Conference*, Chicago, IL, September 2000, (refereed).

P19. "Cell Placement in a CDMA Network," *IEEE Wireless Communications and Networking Conference*, September 1999, (refereed).

P20. "Effects of Call Arrival Rate and Mobility on Network Throughput in Multi-Cell CDMA," *IEEE International Conference on Communications*, June 1999, (refereed).

P21. "Flexible Allocation of Capacity in Multi-Cell CDMA Networks," *IEEE Vehicular Technology Conference*, May 1999, (refereed).

P22. "CCAP: A Strategic Tool for Managing Capacity of CDMA Networks," Teleware Co. Ltd., Seoul, South Korea, 1998, (invited).

Courses Developed

- CSCE 5593: Fundamentals of VoIP. Fundamentals of VoIP, with emphasis on network infrastructure implementation and security. Topics include IP protocol suite, SS7, speech-coding techniques, quality of service, session initiation protocol, and security issues.

- CSCE 5540: Introduction to Sensor Networks. Topics include: design implications of energy (hardware and software), and otherwise resource-constrained nodes; network self-configuration; services such as routing under network dynamics, localization, time-synchronization and calibration; distributed data management, in-network aggregation and collaborative signal processing, programming tools and language support.

- CSCE 5510. Wireless Communication. Point-to-point signal transmission through a wireless channel, channel capacity, channel encoding, and multi-user transmissions. First, second, and third generation cellular systems, and mobility management.

- CSCE 3510. Introduction to Wireless Communication. Fundamentals of wireless communications and networking, with emphasis on first, second, and third generation cellular systems. Topics include point-to-point signal transmission through a wireless channel, cellular capacity, multi-user transmissions, and mobility management.

- CSCE 3020. Communications Systems. Introduction to the concepts of transmission of information via communication channels. Amplitude and angle modulation for the transmission of continuous-time signals. Analog-to-digital

conversion and pulse code modulation. Transmission of digital data. Introduction to random signals and noise and their effects on communication. Optimum detection systems in the presence of noise.

- ENEE 3583. Computer Systems Design I (UNO). The design process of digital computer systems is studied from the instruction set level, system architecture level, and digital logic level. Topics include machine organization, register transfer notation, processor design, memory design, and input/output considerations. Includes semester project.

- ENEE 3584. Computer Systems Design II (UNO). The design and evaluation of contemporary computer systems are analyzed to compare the performance of different architectures. Topics include performance metrics, computer arithmetic, pipelining, memory hierarchies, and multiprocessor systems.

- ENEE 3514. Computer Architecture Laboratory (UNO). Selected experiments examining programmable logic, VHDL and logic synthesis, and including a final design project, to accompany and complement the lecture course ENEE 3584. Three hours of laboratory.

Courses Taught

Fall 2014
- CSCE 3010.1: Signals and Systems
- CSCE 6590.1: Advanced Topics in Wireless Communications & Networks: 4G/LTE

Spring 2014
- CSCE 3510.1: Intro to Wireless Communication (808 – Highly Effective)
- CSCE 5510.1: Wireless Communications (808 – Highly Effective)

Fall 2013
- CSCE 6590.1: Advanced Topics in Wireless Communications & Networks: 4G/LTE (804 – Highly Effective)

Spring 2013
- CSCE 4890.743: Directed Study (no evaluation done)
- CSCE 6940.743: Individual Research (no evaluation done)

Fall 2012
- CSCE 3010.1: Signals and Systems (793 – Highly Effective)
- CSCE 5540.1: Intro to Sensor Networks (814 – Highly Effective)

Spring 2012
- CSCE 3020.1: Communication Systems (809 – Highly Effective)
- CSCE 3510.1: Intro to Wireless Communication (811 – Highly Effective)
- CSCE 5510.1: Wireless Communications (817 – Highly Effective)
- EENG 3810.1: Communication Systems (801 – Highly Effective)

Fall 2011
- CSCE 3010.1: Signals and Systems (793 – Highly Effective)

- CSCE 5540.1: Intro to Sensor Networks (824 – Highly Effective)

Spring 2011
- CSCE 3020.1: Communication Systems (820 – Highly Effective)
- CSCE 3510.1: Intro to Wireless Communication (812 – Highly Effective)
- CSCE 5510.1: Wireless Communications (812 – Highly Effective)
- EENG 3810.1: Communication Systems (826 – Highly Effective)

Fall 2010
- CSCE 3010.1: Signals and Systems (857 – Highly Effective)
- CSCE 5540.1: Intro to Sensor Networks (831 – Highly Effective)

Spring 2010
- CSCE 3020.1: Communication Systems (792 – Highly Effective)
- CSCE 3510.1: Intro to Wireless Communication (793 – Highly Effective)
- CSCE 5510.1: Wireless Communications (834 – Highly Effective)
- EENG 3810.1: Communication Systems (854 – Highly Effective)

Fall 2009
- CSCE 3010.1: Signals and Systems (4.40 / 5.00)
- CSCE 5540.1: Intro to Sensor Networks (4.70 / 5.00)
- EENG 2620.1: Signals and Systems (4.40 / 5.00)

Spring 2009
- CSCE 3020.1: Communication Systems (4.87 / 5.00)
- CSCE 3510.1: Intro to Wireless Communication (4.65 / 5.00)
- CSCE 5510.1: Wireless Communications (4.79 / 5.00)

Fall 2008
- CSCE 3010.1: Signals and Systems (4.91 / 5.00)
- CSCE 5540.2: Intro to Sensor Networks (4.10 / 5.00)
- EENG 2620.3: Signals and Systems (4.91 / 5.00)

Spring 2008
- CSCE 3020.1: Communication Systems (4.68 / 5.00)
- CSCE 3510.1: Intro to Wireless Communication (3.96 / 5.00)
- CSCE 5510.1: Wireless Communications (4.75 / 5.00)

Fall 2007
- CSCE 3010.1: Signals and Systems (4.57 / 5.00)
- CSCE 5540.2: Intro to Sensor Networks (4.01 /5.00)

Summer 2007
- CSCE 3020.1: Fund. of Communication Theory (no evaluation done)
- EENG 3810.1: Communication Systems (no evaluation done)

Spring 2007
- CSCE 5510.2: Wireless Communications (4.75 / 5.00)
- CSCE 5933.6: Fundamentals of VoIP (4.70 / 5.00)

Fall 2006
- CSCE 3010.1: Signals and Systems (4.58 / 5.00)
- CSCE 5540.1: Intro to Sensor Networks (4.70 / 5.00)
- EENG 2620.1: Signals and Systems (4.58 / 5.00)

Summer 2006

- CSCE 3020.1: Fund. of Communication Theory (no evaluation done)
- CSCE 3510.21: Intro to Wireless Communications (no evaluation done)
- CSCE 5510.21: Intro to Wireless Communications (no evaluation done)
- EENG 3810.1: Communication Systems (no evaluation done)

Spring 2006

- CSCE 2610.2: Computer Organization (3.69 / 5.00)
- CSCE 3010.1: Signals and Systems (4.41 / 5.00)
- EENG 2620.1: Signals and Systems (4.41 / 5.00)

Fall 2005

- CSCE 3510.1: Intro to Wireless Communications (4.52 / 5.00)
- CSCE 5510.1: Wireless Communications (4.46 / 5.00)
- CSCE 5933.6: Intro to Sensor Networks (4.60 / 5.00)

Summer 2005

- CSCE 3010.21 (2020): Signals and Systems (no evaluation done)
- CSCE 3510.21: Intro to Wireless Communications (no evaluation done)

Spring 2005

- CSCE 3510.02: Intro to Wireless Communications (4.46 / 5.00)
- CSCI 3100.02: Computer Organization (4.14 / 5.00)

Fall 2004

- CSCE 3510.01: Intro to Wireless Communications (4.15 / 5.00)
- CSCI 4510.01: Machine Structures (4.55 / 5.00)
- CSCI 5330.02: Intro to Wireless Communications (4.05 / 5.00)

Summer 2004

- CSCI 4330.22: Intro to Wireless Communications (no evaluation done)
- CSCI 4330.23: Intro to Wireless Communications (no evaluation done)
- CSCI 5330.22: Intro to Wireless Communications (no evaluation done)

Spring 2004

- CSCI 3100: Computer Organization (4.64 / 5.00)
- CSCI 4330: Intro to Wireless Communications (4.22 / 5.00)

Fall 2003

- CSCI 4510: Machine Structures (4.49 / 5.00)
- CSCI 5330: Intro to Wireless Communications (4.83 / 5.00)

Summer 2003

- CSCI 3100: Computer Organization (no evaluation done)

Spring 2003

- CSCI 3100: Computer Organization (3.84 / 5.00)

Fall 2002

- CSCI 4510: Machine Structures (4.38 / 5.00)

Professional Associations and Achievements

Membership in Professional Organizations

- Senior Member IEEE

- Member, Federation Council of North Texas Universities
- Member, Eta Kappa Nu Electrical Engineering Honor Society
- Member, Golden Key National Honor Society
- Member, Tau Beta Pi Engineering Honor Society

Offices and Committee Assignments in Professional Organizations

- Technical Program Committee Member, IEEE Wireless Communications and Networking Conference, IEEE WCNC 2012
- Technical Program Committee Member, International Wireless Symposium, IWS 2012
- Technical Program Committee Member, IEEE International Conference on Computational Science, IEEE ICCS 2012
- Technical Program Committee Member, IASTED International Conference on Wireless Communications, WC 2012
- Technical Program Committee Member, IEEE WCNC 2011
- International Program Committee Member, IASTED International Conference on Wireless Communications, WC 2011
- Technical Program Committee Member, WTS Wireless Telecommunications Symposium 2009
- Technical Program Committee Member, Mosharaka International Conference on Computer Science and Engineering, Amman, 2008
- Invitation to serve as an NSF reviewer/panelist for Engineering Research Centers (ERC) proposals, 2007
- Technical Program Committee Member, 18th IEEE International Symposium on Personal, Indoor and Mobile Radio Communication, Greece, 2007
- Technical Program Committee Member, Mosharaka International Conference on Computer Science and Engineering, Amman, 2007
- International Program Committee, IASTED International Conference on Wireless and Optical Communication, Canada, 2007
- Program Committee Member, Fifth Annual Wireless Telecommunications Symposium, CA, 2006
- Technical Publications Chair, IEEE Vehicular Technology Conference, Dallas TX, 2005
- Session Chair, International Conference on Computing, Commun. and Control Tech., Austin TX, 2004
- Session Chair, International Conference on Cybernetics and Information Technologies, Orlando FL, 2004
- Session Chair, 8th World Multi Conference on Systemics, Cybernetic, and Informatics, Orlando FL, 2004

Additional Responsibilities and Activities

- Reviewer, *Wireless Communications and Mobile Computing,* 2012 – present
- Reviewer, *Journal of Sensor and Actuator Networks*, 2012 – present

- Reviewer, *IEEE Transactions on Vehicular Technology*, 2011 – present
- Reviewer, *Elsevier Journal of Computers & Electrical Engineering*, 2008 – present
- Reviewer, *IEEE Globecom*, 2007 – present
- Reviewer, *IEEE International Conference on Advanced Networks and Telecommunication Systems (ANTS)*, 2008 – present
- Reviewer, *The International Wireless Communications and Mobile Computing Conference*, 2007 – present
- Reviewer, *Journal on Wireless Communications and Networking*, 2007 – present
- Reviewer, *IEEE Transactions on Communications*, 2007 - present
- Reviewer, *International Journal of Communication Systems*, 2007 – present
- Reviewer, *IEEE Communications Magazine*, 2005 – present
- Reviewer, *Journal of Wireless Networks*, 2004 – present
- Reviewer, *IEEE Transactions on Mobile Computing*, 2004 – present
- Reviewer, *IEEE Transactions on Wireless Communications*, 2004 – present
- Reviewer, *ACM Crossroads*, 2004 – present

Honors and Awards

- Who's Who in America, 2012 Edition
- Winner of Tech Titan of the Future – University Level Award for UNT Robocamps for Girls, Metroplex Technology Business Council, 2010 with **$15,000 cash prize**.
- IEEE Professionalism Award, Ft Worth Chapter, 2008
- UNT College of Engineering Outstanding Teacher Award, 2008
- Certificate of Appreciation: IEEE Vehicular Technology Conference, Dallas, TX, 2005
- Certificate of Appreciation: Denton County Boosting Engineering, Science and Technology (BEST) Robotics Competition, 2004
- Summa Cum Laude Graduate, Ranked First in Undergraduate Class
- The Computer Science Departmental Award for Academic Excellence, Washington University, 1993
- The Dual Degree Engineering Award for Outstanding Senior, Washington University, 1993
- The 1992 Technical Writing Competition Award, The Society for Technical Communication